a survey of european gasoline qualities – summer 1996

Prepared for the CONCAWE Automotive Emissions Management Group by its Special Task Force, AE/STF-2

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ABSTRACT

CONCAWE has conducted a new survey of gasoline qualities in sixteen European countries. Over 1100 samples were collected in the summer period 1996 and analysed. This report summarises the findings by country.

KEYWORDS

Gasoline, characteristics, composition, Europe, fuel specification, survey

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SUMMARY

CONCAWE has conducted a survey of gasoline qualities in Europe (16 countries). Over 1100 samples were collected in summer 1996 and analysed by member companies or independent laboratories (Appendix 1).

This report summarises the findings by country. The following fuel characteristics are reported:

- Density at 15 °C [kg/m³]
- Lead content [mg/l]
- Distillation [°C/vol.%]
- Sulphur content [mg/kg]
- RON
- MON
- Reid Vapour pressure [kPa]
- VLI
- Gum (unwashed) [mg/100 ml]
- FIA (aromatics, olefins, saturates) [v/v%]
- Benzene [v/v%]
- Benzene, Toluene, Xylene [w%]
- Total aromatic content [w%]
- Ether (MTBE, ETBE) [v/v%]
- Alcohols [v/v%]
- Oxygen content [w%]

1. INTRODUCTION

This report describes the quality of automotive gasoline grades in the European market. It will thus provide a useful reference baseline for ongoing studies (in CONCAWE and elsewhere) which are assessing the implications of adjusting gasoline fuel characteristics.

The survey covers the 1996 summer season.

The majority of previous investigations (for example, surveys by Ethyl, Octel, Paramins etc.) were limited in terms of the number of samples analysed. This survey has the advantage of a larger data base.

The objectives of this report are:

- to determine the quality of the different gasoline grades marketed in Europe during the sampling period
- to provide comprehensive data on fuel characteristics to assist in the development of sound cost estimates for changes in those parameters.

These data are **not sales weighted** and this must be considered in any interpretation.

2. METHODOLOGY

In each country, the gasoline samples were taken at various locations, such as refineries, terminals or service stations. These samples were subsequently tested in laboratories run by either the major fuel retailers or by independent laboratories.

Appendix 1 contains an overview of the number of samples taken by country. The report contains analysis results for a total of 1197 fuel samples (1000 branded and 197 non branded). Not all the relevant characteristics were available for fuels of some countries.

Appendix 2 gives an overview of the fuel parameters tested in individual countries. The test methods used are shown in **Appendix 3**. Surveys carried out by individual CONCAWE member companies were collated by the CONCAWE Secretariat to maintain the confidentiality of the data source and to preserve the anonymity of the fuel samples. They were then transferred to the corresponding overviews by AE/STF-2, a **S**pecial **T**ask **F**orce of the Automotive Emissions Management Group.

The complete information on which report is based represents a very large body of data and is available on 3.5" diskettes from CONCAWE upon request. A small handling charge may be applied. Please contact the Secretariat for further information.

STF-2 evaluated the data provided and drew up appropriate overviews for each country which, in addition to the ranges (min, max.) and average values of the individual parameters, also contain details of the number of samples (**Appendix 4**).

The fuel specifications requirements applicable at the time the samples were taken are also included. The ranges and average values for the most relevant fuel parameters for each country are also presented graphically (**Appendix 5**).

The most relevant information concerning:

- sampling/testing
- specifications
- additives
- sales (consumption)

can be found in the "Quality Statement" section for each country.

Sales (total consumption) quoted in the report are based on information from the International Energy Agency (IEA).

3. QUALITY STATEMENTS

3.1. AUSTRIA

Sampling/Testing

All samples were taken from service stations in the area of Steiermark and Kärnten (South of Austria).

The analyses of the gasoline samples were carried out by the University of Technology, Vienna, and by a member company research laboratory.

Specifications

Quality requirements for Austria's unleaded gasolines are based on the CEN Standard EN 228.

National Specifications:

Limit for benzene content: max. 3 %vol.

Three grades of unleaded gasoline are marketed in Austria:

Regular:	MON = 82,5 min.; RON = 91 min.
Super:	MON = 85 min.; RON = 95 min.
SuperPlus:	MON = 87 min.; RON = 98 min.

Leaded Gasoline has not been available in Austria since 1993.

Additives

Performance additive packages are individually added by most companies. According to the “Österreichische Kraftstoffverordnung” of 1992 Super Plus has to be treated with Anti-Valve-Seat-Recession-Additives.

1996 Sales

Unleaded: 2.215 metric tons x 10^6

The market share of the different qualities and the trend for increase/decrease in the market of Austria at the time of sampling were:

Unleaded:

- Regular: 32.4 % constant
- Super: 47.2 % increasing
- SuperPlus: 20.4 % decreasing

3.2. BELGIUM

(Only data available)

1996 Sales

Unleaded: 2.026 metric tons x 10^6
Leaded: 0.712 metric tons x 10^6

74% unleaded

3.3. DENMARK

Sampling/Testing

Samples for this report were all collected from refineries and terminals in Denmark from May to August 1996. All samples were analysed by the marketing oil companies, but the information is not complete. Especially GC data are not available.

Specifications

Leaded gasoline is no longer marketed since 1993. Instead, the industry offer the UL 98 octane quality blended with Anti-Valve-Seat-Recession Additive to satisfy older engine technology.

The different gasoline qualities are normally identified by their octane quality number (RON). Gasoline pumps are always marked with "92", "95" or "98". In this report the same table headings are used for all countries. To avoid any confusion regarding the names "Regular, Premium, Super" the headings for Danish qualities in this report are:

- Regular unleaded (92) = 92 RON
- Super unleaded (95) "Europremium" = 95 RON
- Super unleaded (98) "SuperPlus" = 98 RON

These three summer grades (1 May - 31 August) were marketed according to the EN 228 Specification, Volatility Class 4.

The main parameters of the specifications (Danish. Pet. Inst. 01/10/90) at the time of sampling were:

	ULG 98	ULG 95	ULG 92
RON (min.)	98	95	92
MON (min.)	88	85	83
RVP (bar)	0.45 - 0.80	0.45 - 0.80	0.45 - 0.80
VLI (max.)	1050	1050	1200
E70 (%v/v)	15 - 45	15 - 47	15 - 47
E100 (%v/v)	40 - 65	43 - 70	43 - 70
E180 (%v/v, min)	85	85	85
RESIDUE (%v/v, max)	2		
DENSITY 15 ºC (kg/m^3)	730 - 780	730 - 770	710 - 750
Sulphur (%m/m, max.)	0.05	0.05	0.05

Additives

Performance additive packages are individually added by most companies (opt.).

1996 Sales

Unleaded: 1.929 metric tons x 10^6
Leaded: NIL

100% unleaded

There is no trend for increase/decrease between 98/95/92 octane.

3.4. FINLAND

Gasolines marketed in Finland are reformulated except for some batches.

Compared to the standard specification environmentally more acceptable reformulated gasolines are encouraged by means of a tax incentive. Environmental grades exceeding the tax incentive limits are also available.

Sampling/Testing

Samples for this survey were collected from refineries during June to July 1996. One sample collected at a service station was also reported.

Samples were analysed at refinery laboratories and a member company research laboratory.

Specifications

Gasolines are specified in SFS-EN 228. Reformulated gasolines are given a tax reduction (0,05 FIM/l). The requirements are oxygen content of 2 - 2.7 %v/v, and

benzene below 3 %v/v. The vapour pressure is specified at max. 70 kPa from 1 June to 31 August and at max. 90 kPa outside this summer period.

In Finland reformulated gasoline is also marketed containing benzene below 1 %v/v and sulphur below 100 mg/kg.

Additives

All fuels marketed contain a detergent additive package. The quality labelled as "99+" and a part of unleaded 98 also contain Anti-Valve-Seat-Recession-Additives.

1996 Sales

Unleaded: 1.834 metric tons x 10^6
Leaded: 0 metric tons x 10^6

100% unleaded

The following table shows the development of sales for the period from 1992 to 1994 by grades.

	1992	**1993**	**1994**	**1995**	**1996**
Unleaded 95	62.5%	66.0%	63.5%	66.6%	70.4%
Unleaded 98	7.8%	12.1%	14.9%	15.2%	14.7%
Unleaded 99	0.0%	8.8%	21.5%	18.2%	14.8%
Leaded 99	29.7%	13.1%	0.0%	0.0%	0.0%
Total 1000 m³	2 650	2 500	2 560	2 529	2 446

3.5. FRANCE

Sampling/Testing

The samples for this survey were all taken at service stations run by major fuel retailers or by discounters.

The analyses of the samples were carried out by a member and by independent laboratories.

Specifications

Quality requirements for unleaded Super (Supercarburant sans plomb (95) and (98)) are based on the CEN Standard EN 228.

National Specifications:

The unleaded fuels are coloured with a green tracer. From 20 June until 9 August the summer grades are based on volatility class 1 (EN 228).

Additives

Only gasolines of the refining companies are additivated with individual performance-additive-packages.

1996 Sales

Unleaded: 8.391 metric tons x 10^6
Leaded: 6.610 metric tons x 10^6

55.9% unleaded

3.6. GERMANY

Sampling/Testing

The samples of the gasoline qualities tested for this report were all taken at service stations run by the five major fuel retailers (classified as A) in the vicinity of the corresponding refinery, at service stations run by smaller fuel retailers (classified as B), and outlets run by discounters (hypermarkets), in areas selected for high throughput.

Samples of leaded Super have not been taken.

The tests were carried out in laboratories run by the A companies and results were checked jointly.

Specifications

When the samples were taken, DIN EN 228 specification for unleaded fuels and DIN 51 600 specification for leaded Super were in force.

These two standards are embodied in the so called 10. BImSchV (Bundes-Immissionsschutz-Verordnung).

This regulation lays down that any fuel not complying with the limits given in DIN EN 228 or DIN 51 600 shall not be introduced into the market. Quality compliance is checked by an inspectorate and failure to comply is dealt with accordingly.

Since the end of 1996 leaded gasoline is no longer available in the German market.

The benzene content of SuperPlus (RON 98) is voluntarily limited at a maximum of 1 %v/v.

According to the German gasoline Lead Law (Benzin-Blei-Gesetz) it is not allowed to introduce metal containing additives in gasolines during manufacturing or to market such products.

To satisfy older engine technology Anti-Valve-Seat-Recession-Additives are available at most of the service stations to be added by the customer (not restricted by law).

Additives

The fuels marketed by the five majors all contained their own individual, multi-purpose additive packages. The fuels marketed by the B-companies contained additives with lower concentration and unknown performance. The hypermarket fuels, with some exceptions, did not contain additives.

1996 Sales

Unleaded: 29.233 metric tons x 10^6
Leaded: 0.782 metric tons x 10^6

97.4% unleaded

The market share of the different unleaded qualities at the end of 1996 were:

- Normal bleifrei (Regular (91)): 40%
- Super bleifrei (Super unleaded (95)): 54%
- Super Plus (Super unleaded (98)): 6%

3.7. GREAT BRITAIN

Sampling/Testing

The samples used to provide the data for the survey were drawn from refineries, terminals and retail outlets. The samples were analysed at oil company laboratories.

Specifications

The following specifications apply to the gasoline grades used in the survey:

- Unleaded Petrol, Premium (95) BS EN 228
- Unleaded Petrol, Super (98) BS 7800
- Leaded Petrol (97) BS 4040

The above grades also comply with The Motor Fuel (composition and content) Regulations 1994. (Statutory Instrument No. 2295).

Summer grade product sold ex petrol retail outlets shall comply with CEN class 4 volatility requirements during the period 1 June to 31 August inclusive.

Additives

The majority of gasoline marketed in the UK contains Performance Enhancing Additives, although these are not mandatory.

1996 Sales

Unleaded: 15.231 metric tons x 10^6
Leaded: 7.178 metric tons x 10^6

68% unleaded

3.8. GREECE

Sampling/Testing

All the samples mentioned in this report were taken from the refinery storage tanks and the analyses were performed at the refinery laboratory.

Specifications

During the period of sampling the following specifications in Greece were in force:

Premium: GREEK Government Gazette 556/B/27.7.93
190/B/21.3.95, 271/B/10.4.95

Regular: GREEK Government Gazette 581//1991,
774/B/12.10.94, 190/B/21.3.95, 271/B/10.4.95

The summer period for stricter specification of RVP and VLI lasts from 1 April to 31 October.

The main properties/limits of the specifications at the time of sampling were:

PROPERTY			LIMITS		
			Premium leaded	95 RON unleaded	98 RON unleaded
1.	Density at 15 °C	(kg/m³)	720 - 770	725 - 780	
2.	Distillation:				
	Evaporated at 70 °C (E70)	(%v/v)	min. 10	15 – 45	
	" at 100 °C (E100)	"	30 - 65	40 – 65	
	" at 180 °C (E180)	"	min. 85	min. 85	
	Final boiling point	(°C)	max. 215	max. 215	
	Distillation residue	(%v/v)	max. 2	max. 2	
3.	Vapour pressure (RVP) at 37.8°C	(kPa)			
	a. From 1 April to 31 October		max. 62	35 – 70	
	b. From 1 November to 31 March		max. 80	45 - 80	
4.	Sulphur	(%m/m)	max. 0.10	max. 0.05	
5.	Lead	(g/l)	max. 0.15	max. 0,013	
6.	RON		96 - 98	min. 95	min. 98
7.	Copper strip corrosion, 3 h, at 50°C, ASTM No		max. 1	max. 1	
8.	Existent gum, solvent washed	(mg/100 ml)	max. 4	max. 5	
9.	Oxidation stability (hours)		min. 6	min. 6	
10.	Benzene	(%v/v)	max. 4	max. 4	
11.	Aromatics	(%v/v)	to be reported		
12.	Olefins	(%v/v)	to be reported		
13.	Colour		Green	undyed	
14.	Organic oxygenated compounds[a)]				
	i. Total oxygen	(%m/m)	max. 2.5	max. 2.5	
	ii. Ingredients	(%v/v)			
	Methanol[b)]		max. 3	max. 3	
	Ethanol[c)]		max. 5	max. 5	
	iso-propanol		max. 5	max. 5	
	iso-butanol		max. 7	max. 7	
	t-butanol		max. 7	max. 7	
	Other primary alcohols[d)]		max. 7	max. 7	
	Methyl-t-butyl-ether (MTBE)		max. 10	max. 10	
	Methyl-t-amyl-ether (TAME)		max. 10	max. 10	
	Ethyl-t-butyl-ether (ETBE)		max. 10	max. 10	
	Other ethers[c)]		max. 10	max. 10	
	Acetone[f)]		max. 0.8	max. 0.8	

(a) Oxygenated organic compounds addition is permitted (like alcohols, ethers or mixtures), but in percentage which does not exceed the limits in 85/536 EC Directive /2133/87 decision of Greek State Chemical Laboratory G.G.G. 823/B/9.11.88.

(b) With Stabilisers

(c) Possible need for stabilisers
Acidity smaller than 0,007 % m/m (as acetic acid), when is determined according with the method ISO 1388-2

(d) Their boiling point is not over the final distillation boiling point of gasoline

(e) With five or more carbon atoms, with their boiling point not over the final distillation boiling point of gasoline

(f) As a by - product of the synthesis of particular oxygenated compounds

Additives

Addition of gasoline additives by the Marketing Companies is mainly done for detergent purposes.

According to SEEPE estimations, additives penetration in gasoline grades in the Greek market is:

- in unleaded gasoline: approx. 50 %
- in leaded gasoline: approx. 59 %

1996 Sales

Unleaded: 1.107 metric tons x 10^6
Leaded: 1.833 metric tons x 10^6

37.7% unleaded

- Premium leaded gasoline: approx. 63 % of the market
- Unleaded gasoline: approx. 36 % of the market
- Other gasolines: approx. 1 % of the market

3.9. HUNGARY

Sampling/Testing

The data submitted are from refinery batch samples and supply about 80% of branded service stations and about 45 - 50 % of non-branded service stations.

Specifications

	leaded *) 92AB-92	**leaded 98 AB-98**	**unleaded 91 Eu-91**	**unleaded 95 Esz-95**	**unleaded 98 Esz-98**
RON, min.	92	98	91	95	98
MON, min.	83	88	82.5	85	88
lead, g/l max.	0.15	0.15	0.013	0.013	0.013
benzene, %v/v	max. 3.0				
sulphur, %m/m	max. 0.05				
Evaporation residue, g/100 cm³	max. 5				
copper corrosion	max. 1				
specific gravity at 15 °C kg/m³	720 -770	730 -780	720 - 780		
Distillation characteristics					
T70E, %v/v summer / winter	15 - 42 / 20 – 47				
T100E, %v/v summer / winter	40 - 65 / 42 – 70				
T180, %v/v at least	85				
End boiling point,. °C max.	215				
Residue, %v/v, max.	2				
Reid vapour pressure, bar summer/winter	0.45		0.70 / 0.60	0.90	
colour	greenish blue	red	green	colourless	colourless

*) withdrawn from 1.7.1996

Additional features

1. Gasoline grades are free of water, mechanical impurities and water soluble acids and bases.

2. All grades are free of phosphorous.

3. Alcohols can be used only on the basis of agreements.

4. The maximum amount of oxygenates is related to a threshold oxygen content of 2.5 % and is in detail as follows:

MeOH	max. 3%	conditioned to use of cosolvents (higher alcohols) at a minimum rate of 2/3
EtOH	max. 5%	conditioned to use of cosolvents (higher alcohols) at a minimum rate of 2/3
IPA	max 5%	
TBA, IBA	max. 7%	
MTBE	max. 10%	

Additives:

All gasoline samples tested were treated with an additive package of the latest standard.

1996 Sales

Unleaded: 0.810 metric tons x 10^6
Leaded: 0.456 metric tons x 10^6

64% unleaded

3.10. ITALY

Sampling/Testing

All samples which were taken during July and August 1996 came from branded service stations; no samples were taken at terminals or refinery locations.

The sampling plan is representative of main markets (i.e. large cities) and refineries, or main supply routes. Samples were taken in Turin, Genoa, Milan, Cremona, Trieste, Venice, Ravenna, Bologna, Florence, Ancona, Pescara, Rome, Naples, Taranto, Reggio Calabria, Catania, Palermo, Cagliari.

Although the total number of samples is roughly proportional to the market share of different companies, samples are not fully sales-weighted in every area, to take account of product exchanges.

Specifications

In Italy two grades of gasolines are available on the market.

- the Europremium super unleaded (95), called "Benzina senza Piombo" in Italian,
- the leaded super (97), called "Benzina super" in Italian.

Unleaded gasoline has to comply with the EN 228 (1993) specification (Volatility Class 1).

Leaded gasoline has to comply with the Italian National Specifications, CUNA NC 623-01.

CUNA* NC-Requirements

Density	kg/m³	725 - 770
Lead content	g/l	max. 0.15
Distillation		
E 70	% v/v	10 – 45
E 100	% v/v	30 – 70
E 180	% v/v	min. 85
FBP	°C	max. 220
Sulphur content	% m/m	max. 0.20
RON		min. 97.0
MON		min. 87.0
Reid Vapour Pressure	kPa	40 - 73.5
Benzene	% v/v	max. 5

* **CUNA**: **C**ommissione Tecnica di **Un**ificazione nell'**A**utoveicolo

Additives

It is estimated that about 70 % of unleaded gasoline is treated with detergent additives.

1996 Sales

Unleaded: 8.084 metric tons x 10^6
Leaded: 9.639 metric tons x 10^6

45.6% unleaded

3.11. NETHERLANDS

(Only data available).

3.12. NORWAY

Sampling/Testing

All samples for this reported survey were collected from refineries and terminals in Norway from May to August 1996.

All samples were analysed by the marketing oil companies, but the information is not complete. Especially GC data are not available.

Specifications

Norway has no national standard required by law, but the industry has accepted the EN 228 standard for unleaded gasolines.

Leaded gasoline has not been marketed since 1993. Instead, the industry offer the ULG 98 octane quality blended with Anti-Valve-Seat-Recession-Additives to satisfy older engine technology.

The different gasoline qualities are named by their octane quality number (RON). Gasoline pumps at service stations are always labelled with "95" or "98". In this report the same table headings are used for all countries. To avoid any confusion regarding the names "Regular, Premium, Super" the headings for Norwegian qualities in this report are:

- Super unleaded (95) "Europremium" = 95 RON
- Super unleaded (98) "SuperPlus" = 98 RON

The two summer grades (1 April - 31 August) on the market are:

- 98 RON, EN 228 Volatility Class 5
- 95 RON, " " "

The main specification properties (NS EN 228) at the time of sampling were:

	ULG 98 *	**ULG 95** *
RON	min. 98	min. 95
MON	min. 87	min. 85
RVP (bar)	0.55 - 0.90	0.55 - 0.90
VLI (max.)	1100	1100
E70 (%v/v)	15 - 47	20 - 50
E 100 (%v/v)	43 - 70	43 - 70
E180 (%v/v, min.)	85	85
FBP (°C)	max. 215	max. 215
Density 15 °C (kg/m^3)	725 - 780	725 - 780
Sulphur (%m/m)	max. 0.05	max. 0.05

* ULG = unleaded gasoline

Additives

Performance additives packages are individually added by most companies (optional).

1996 Sales

Unleaded: 3.862 metric tons x 10^6
Leaded: 0.341 metric tons x 10^6

91.9% unleaded

The trend shows that sales of ULG 98 are decreasing and sales of ULG 95 are increasing.

3.13. PORTUGAL

Sampling/Testing

All samples were taken from refineries and tests were run at refinery laboratories.

Specifications

All grades are regulated for some properties by an Official Specification: Portaria 1489/95 dated 29 December 1995. Other properties according to internal specifications.

Seasonal limits:

RVP for all grades:

15 October - 31 March	60 - 95 kPa	(10*RVP+7*E70 = max. 1200)
1 April - 31 May	45 - 80 kPa	(10*RVP+7*E70 = max. 1050)
1 June - 14 October	35 - 70 kPa	(10*RVP+7*E70 = max. 900)

Additives (total market)

The penetration of performance-additives in the Portuguese market is estimated as follows:

- Unleaded gasoline 43 %
- Leaded gasoline 38 %
- Diesel fuel 37 %

1996 Sales

Unleaded: 0.804 metric tons x 10^6
Leaded: 1.127 metric tons x 10^6

41.6% unleaded

The trends by grade in the market were:

- Super leaded → decreasing
- Europremium → increasing
- SuperPlus → increasing

3.14. SPAIN

Sampling/Testing

All samples were taken from refineries, corresponding with refinery deliveries to intermediate distribution terminals. At the sampling the products were not additivated yet. The analyses were carried out in the Refinery Laboratories, except FIA- and GC-Aromatics analyses which were carried out in laboratories of one Research Centre.

The methods of analysis were as indicated in the specifications or equivalent.

The Gum content monitored is the **washed** gum.

Specifications

There were three different types of gasolines marketed:

Super	97 RON leaded
EUROSUPER	95 RON unleaded
SUPERPLUS	98 RON unleaded

The 97 RON leaded grade has to comply with the specifications according to the “Real Decreto 1485/1987" modified by the “Real Decreto 1513/1988". The specs for 95 RON unleaded were equivalent to the CEN standard EN 228 and published in the “Real Decreto 398/1996". There is no National Specification for the 98 RON unleaded but it is specified by an Industrial Agreement.

Units		Super unleaded 95 RON RD 398/1996		Super leaded 97 RON RD 1485/1987*)		SuperPlus unleaded Industry agreed spec.	
		max.	min.	max.	min.	max.	min.
Specific gravity 15 °C	kg/m³	780	725	780	720	780	725
Distillation							
Recovered at 70 °C	%v/v	45	15	45	10	45	15
Recovered at 100 °C	%v/v	65	40	70	30	65	40
Recovered at 180 °C	%v/v		85		80		85
End Point	°C	215		210		215	
Residue	%v/v	2		2		2	
Losses				1.5			
Reid Vapour Pressure	kPa						
Winter (1 Nov. - 31 March)		80	45	78	55	80	45
Summer (1 April - 31 October)		70	35	64	48	70	35
VLI (10 RVP) + 7 E 70)							
Winter (1 Nov. - 31 March		1050				1050	
Summer (1 April - 31 October)		900				900	
Sulphur	%m/m	0.05		0.13		0.05	
Copper Corrosion	Scale	Class 1				Class 1	
Oxidation Stability	minutes		360		240		360
Gum content (washed)	mg/100 ml	5		5		5	
Lead	g/l	0.013		0.15		0.013	
Benzene	%v/v	5		5		5	
Research Octane Number			95		97		98
Motor Octane Number			85		87		
(RON + MON)/2							93

* Modified by RD 1513/1988 (Lead content)

Additives

Performance additive packages are individually added by production or distribution companies. The penetration of additives in gasolines in the market is estimated of more than 90 %.

1996 Sales

Unleaded: 3.154 metric tons x 10^6
Leaded: 5.930 metric tons x 10^6

34.7% unleaded
Sales of both unleaded gasoline grades are increasing.

3.15. SWEDEN

Sampling/Testing

Samples for this report were all collected from refineries and terminals in Sweden from April to August 1996. All samples were analysed by the marketing oil companies, but not for all properties. Especially GC data were not available.

Only class 2 gasoline for catalyst cars was sampled for this survey.

Specifications

Leaded gasoline is not marketed. Instead, the industry offer the UL 98 octane quality blended with Anti-Valve-Seat-Recession additive to satisfy older engine technology.

During 1993, Sweden has developed an environmental classification for gasolines, comprising 4 different classes. From 1994, the quality marketed, both 95 and 98 octane, follows Class 2, specifications described in the following table. The Class 1 project is intended to be implemented in 1997.

The different gasoline qualities are normally named by their octane quality number (RON). Gasoline pumps are always labelled with "95" or "98". In this report the same table heading are used for all countries. To avoid any confusion regarding the names "Regular, Premium, Super" the headings for Sweden qualities in this report are:

- Super unleaded (95) "Europremium" = 95 RON
- Super unleaded (98) "SuperPlus" = 98 RON

The two summer grades, UL 95 and UL 98, are marketed in the period:

- Summer grade south: 14 April - 30 September
- Summer grade north: 14 May - 31 August

Property	**Class 2**
	Catalyst
Sulphur %m/m (max.)	0.01
RVP (S/W) kPa (max.)	70/95
RVP (S/W) kPa (min.)	45/75
E100 (S/W) %v/v (min.)	47/50
FBP °C (max.)	205
Benzene %v/v (max.)	3
Aromatic index (max.) (Aromatics/13)+Benzene	5.5
Oxygen %m/m (max.)	2
Lead mg/l (max.)	5
Phosphorus mg/l (max.)	Nil

Additives

Performance additives packages are individually added by most of the companies (opt.).

1996 Sales

Unleaded: 4.203 metric tons x 10^6
Leaded: 0 metric tons x 10^6

100% unleaded

3.16. SWITZERLAND

(Only data available).

1996 Sales

Unleaded: 3.223 metric tons x 10^6
Leaded: 0.459 metric tons x 10^6

87.5% unleaded

4. CONCLUSIONS

CONCAWE's gasoline quality survey, representing samples from a wide range of outlets, provides an overview of relevant fuel parameters in sixteen European countries.

It was not possible to present true sales weighted average qualities as insufficient samples were taken in some countries. Information on sales/trends can be found under the "Quality Statements" for each country.

The samples were taken in summer 1996 (mostly in June). In most of the countries (Denmark, Finland, Greece, Hungary, Norway, Portugal, Spain and Sweden) samples were taken at refineries/terminals. In Austria, Germany and Italy the samples were drawn at retail service stations. In Great Britain the samples were taken at both locations.

In countries where a sufficient number of samples was taken the results provide a reliable overview of the corresponding market situation.

As can be seen from the overviews of the fuel characteristics (Appendix 4 and 5), gasoline qualities by country and within individual countries can vary significantly. The reasons therefore are highly complex and the following provides only some basic facts:

- Gasoline properties are also dependent on refinery configuration.
- The demand ratio between gasoline, industrial gas-oil, diesel fuel and kerosine also influences the gasoline quality.
- The crude source favoured by particular countries/refineries is a complex issue. Basic crude quality has a major impact on resultant gasoline quality characteristics.

In CONCAWE's estimation the use of different (albeit approved) test methods when analysing the samples has little influence on the results.

In most of the countries a major segment of the market use multifunctional / detergent additives. The penetration of such fuels in the individual countries is mentioned in section 3 "Quality Statements".

Additive type, performance and dosage cannot be established by routine determination of the unwashed gum. However concentrations of additives used can vary widely in different market segments.

In most of the countries in this survey the FBP of the gasoline grades is specified not to exceed 215 °C. Values above 215 °C obtained in some fuel samples could possibly indicate contamination with diesel fuel by distribution.

Other distillation figures show a wide variation regarding to crude sources, refinery technology and different volatility classes as mentioned before.

Whilst a wide spread was found in the Vapour Pressure figures, these do not show a strict correlation between high RVP and "cooler climate" and low RVP in "warmer climate".

The EN 228 specification for unleaded gasoline was not applicable in all of the countries involved at the time the samples were taken for this survey.

General Comments on the Results

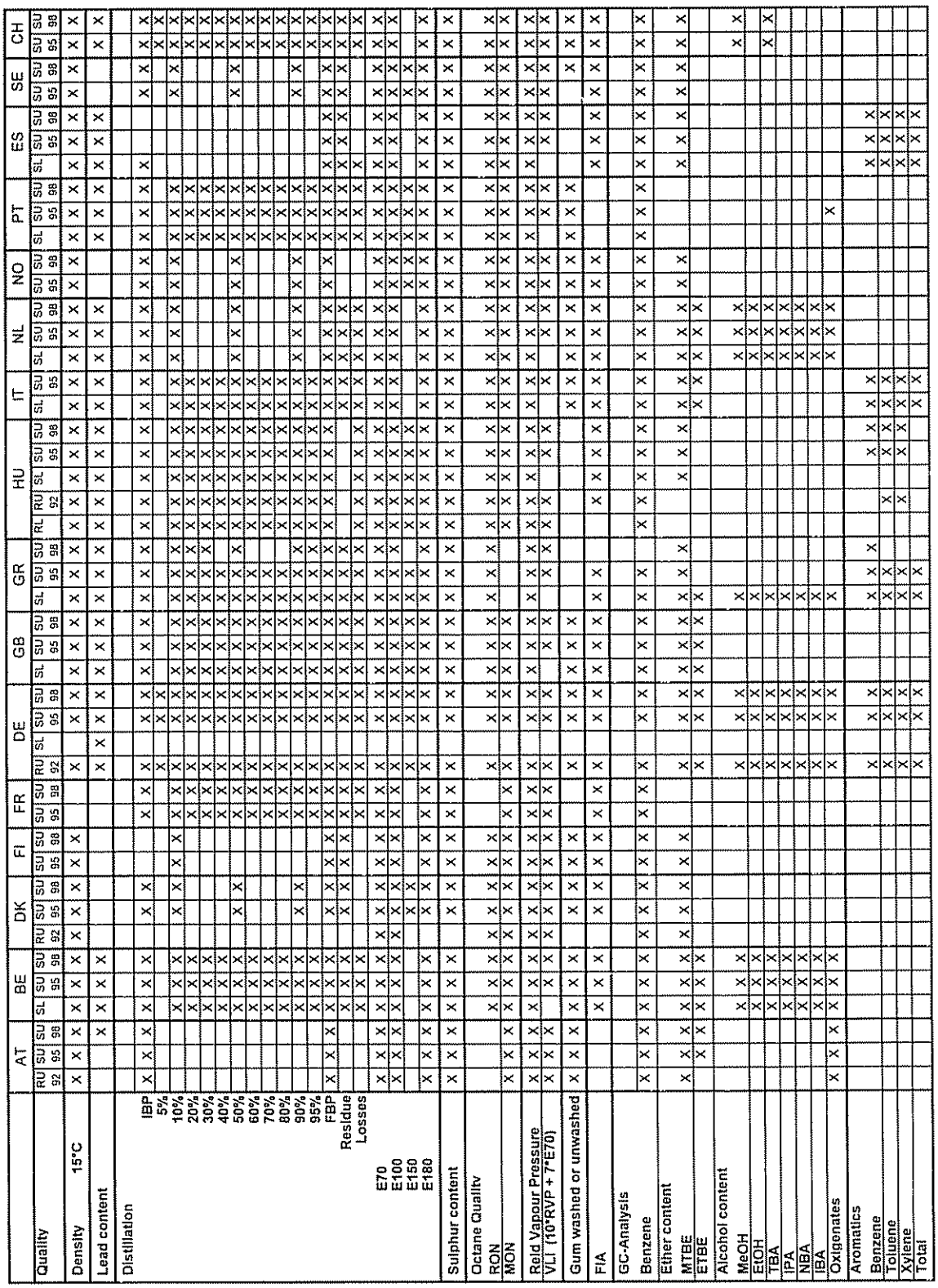
These data are not sales weighted and this must be considered in any interpretation. This survey gives an overview of gasoline qualities in Europe in 1996 and variation from one country to another result from:

- differences in refinery complexity, crude slate and amount of different fuel grades produced
- different level of specifications:
  - EN 228 was not introduced in all of the participating countries
  - different volatility classes
- the structure of the individual markets.

APPENDIX 1 COUNTRIES SURVEYED AND SAMPLE NUMBERS

Country	Country Abbr.	Samples	branded	non branded	%brand. : % non brand.
Austria	AT	30	15	15	50 : 50
Belgium	BE	26	23	3	90 : 10
Denmark	DK	47	47	0	100 : 0
Finland	FI	12	1	11	10 : 90
France	FR	41	32	9	80 : 20
Germany	DE	319	172	147	60 : 40
Great Britain	GB	87	75	12	86 : 14
Greece	GR	95	95	0	100 : 0
Hungary	HU	116	116	0	100 : 0
Italy	IT	124	124	0	100 : 0
Netherlands	NL	24	24	0	100 : 0
Norway	NO	103	103	0	100 : 0
Portugal (S/N)	PT	31	31	0	100 : 0
Spain	ES	21	21	0	100 : 0
Sweden	SE	84	84	0	100 : 0
Switzerland	CH	37	37	0	100 : 0
Total		1197	1000	197	86 : 14

APPENDIX 2 TEST DATA AVAILABLE BY COUNTRY



Quality	AT RU 92	AT SU 95	AT SU 98	BE SL	BE SU 95	BE SU 98	DK RU 92	DK SU 95	DK SU 98	FI SU 95	FI SU 98	FR SU 95	FR SU 98	DE RU 92	DE SL	DE SU 95	DE SU 98	GB SL	GB SU 95	GB SU 98	GR SL	GR SU 95	GR SU 98	HU RL	HU RU 92	HU SL	HU SU 95	HU SU 98	IT SL	IT SU 95	NL SL	NL SU 95	NL SU 98	NO SL	NO SU 95	NO SU 98	PT SL	PT SU 95	PT SU 98	ES SL	ES SU 95	ES SU 98	SE SU 95	SE SU 98	CH SU 95	CH SU 98
Density 15°C	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lead content				X	X	X									X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X
Distillation																																													
IBP	X	X	X	X	X	X		X	X			X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
5%														X		X	X							X	X	X	X	X	X	X	X	X													
10%				X	X	X		X	X	X	X	X	X	X		X	X							X	X	X	X	X	X	X	X	X				X	X	X				X	X	X	X	X
20%				X	X	X						X	X	X		X	X							X	X	X	X	X	X	X	X	X				X	X	X						X	X
30%				X	X	X						X	X	X		X	X							X	X	X	X	X	X	X	X	X				X	X	X						X	X
40%				X	X	X						X	X	X		X	X							X	X	X	X	X	X	X	X	X				X	X	X						X	X
50%				X	X	X		X	X			X	X	X		X	X				X	X	X	X	X	X	X	X	X	X	X	X				X	X	X				X	X	X	X
60%				X	X	X		X	X			X	X	X		X	X				X	X	X	X	X	X	X	X	X	X	X	X				X	X	X				X	X	X	X
70%				X	X	X		X	X			X	X	X		X	X				X	X	X	X	X	X	X	X	X	X	X	X				X	X	X				X	X	X	X
80%				X	X	X		X	X			X	X	X		X	X				X	X	X	X	X	X	X	X	X	X	X	X				X	X	X				X	X	X	X
90%				X	X	X		X	X			X	X	X		X	X				X	X	X	X	X	X	X	X	X	X	X	X				X	X	X				X	X	X	X
95%				X	X	X		X	X			X	X	X		X	X				X	X	X	X	X	X	X	X	X	X	X	X				X	X	X				X	X	X	X
FBP	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Residue				X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Losses				X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E70	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E100	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E150				X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
E180	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sulphur content	X	X	X	X	X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Octane Quality																																													
RON				X	X	X		X	X	X	X	X	X			X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
MON	X	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Reid Vapour Pressure	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
VLI (10*RVP + 7*E70)	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X		X	X		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Gum washed or unwashed	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X						X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
FIA				X	X	X		X	X	X	X	X	X	X		X	X	X	X	X				X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
GC-Analysis																																													
Benzene	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ether content																																													
MTBE	X	X	X	X	X	X	X	X	X	X	X			X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
ETBE		X	X	X	X	X		X	X	X	X			X		X	X	X	X	X						X	X	X																
Alcohol content																																													
MeOH				X	X	X								X		X	X		X										X	X	X		X	X									X	X
EtOH				X	X	X								X		X	X		X										X	X	X		X	X									X	X
TBA				X	X	X								X		X	X		X										X	X	X		X	X									X	X
IPA				X	X	X								X		X	X		X										X	X	X		X	X										
NBA				X	X	X								X		X	X		X										X	X	X		X	X										
IBA				X	X	X								X		X	X		X										X	X	X		X	X										
Oxigenates	X	X	X	X	X	X								X		X	X		X										X	X	X					X								
Aromatics																																													
Benzene														X		X	X		X		X	X				X	X	X								X	X	X		X	X			
Toluene														X		X	X		X		X	X			X	X	X	X								X	X	X						
Xylene														X		X	X		X		X	X			X	X	X	X								X	X	X						
Total														X		X	X		X		X	X				X	X	X								X	X	X		X	X			

APPENDIX 3 PARAMETERS MEASURED/TEST METHODS

Properties	Methods EN 228	Methods Survey 1996
1. Density at 15°C	ISO 3675/ASTM D 4052	ISO 3675/ASTM D 4052
2. Research octane number	ISO 5164	ISO 5164
3. Motor octane number	ISO 5163	ISO 5163
4. Lead content	EN 237	EN 237
5. Sulphur content	EN 24260/ISO 8754	EN 24260/ISO 8754
6. Alcohols content	---	NF M054/DIN51413
7. Ether content	---	NF M054/DIN51413
8. Benzene content	EN 238	EN 238
9. FIA Aromatics content Saturates Olefins	---	ASTM D 1319-95
10. Distillation E 70 E 100 E 125 E 180 IBP FBP	ISO 3405	ISO 3405
11. Volatility Reid Vapour Pressure E 70 VLI (10 x RVP + 7 x E 70)	 EN 12 ISO 3405	 EN 12/ EN 798 ISO 3405
12. Oxygenates content	---	NF M054/DIN51413
13. Existent gum content	EN 5	EN 26246
14. Oxidation stability	ISO 7536	---
15. Copper strip corrosion	ISO 2160	---

APPENDIX 4

OVERVIEWS BY COUNTRY

Austria

Quality		Regular unleaded (91)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 780	10	727.0	760.0	743.0	725 - 780	10	736.6	759.5	751.3	725 - 780	10	754.4	766.9	759.8
Lead content	mg/l	max. 13	---	---	---	---	max. 13	---	---	---	---	max. 13	10	<1	<1	<1
Distillation																
IBP	°C	---	10	35	39	37	---	10	33	39	36	---	10	33	40	37
5%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
20%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
30%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
40%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
50%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
60%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
70%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
80%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
90%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
95%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
FBP	°C	max. 215	10	186	245	204	max. 215	10	194	222	207	max. 215	10	193	218	201
Residue	% v/v	max. 2	---	---	---	---	max. 2	---	---	---	---	max. 2	---	---	---	---
Losses	% v/v	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
E70	% v/v	15 - 45	10	27.3	47.5	33.4	15 - 45	10	27.4	34.6	30.1	15 - 45	10	24.2	31.5	28.8
E100	% v/v	40 - 65	10	41.6	64.8	55.6	40 - 65	10	48.0	58.0	51.8	40 - 65	10	47.6	53.5	51.1
E150	% v/v	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
E180	% v/v	min. 85	10	93.2	97.5	95.3	min. 85	10	93.2	97.6	95.3	min. 85	10	94.0	97.0	95.7
Sulphur content	mg/kg	max. 500	10	20	170	49	max. 500	10	10	120	54	max. 500	10	10	80	31
Octane quality																
RON		min. 91.0	---	---	---	---	min. 95.0	---	---	---	---	min. 98.0	10	98.0	99.2	98.4
MON		min. 82.5	10	82.6	85.0	83.2	min. 85.0	10	84.6	87.2	85.4	min. 87.0	10	86.6	87.6	87.2
Reid Vapour Pressure	kPa	35 - 70	10	62	69	65	35 - 70	10	64	78	68	35 - 70	10	54	71	64
VLI (10*RVP + 7*E70)		max. 950	10	836	942	878	max. 950	10	843	1002	889	max. 950	10	738	934	846
Gum unwashed	mg/100ml	---	10	4.0	64.8	36.9	---	10	11.2	64.8	43.9	---	10	26.6	78.0	55.3

Austria

Quality		Regular unleaded (91)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Olefins	% v/v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Saturates	% v/v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GC-Analysis																
Benzene	% v/v	max. 3	10	0.6	2.7	1.7	max. 3	10	0.5	2.6	1.8	max. 3	10	0.5	2.6	1.4
Ether content		max. 15					max. 15					max. 15				
MTBE	% v/v		10	0.2	3.0	0.9		10	0.3	9.1	3.7		10	5.9	10.7	8.3
ETBE	% v/v		—	—	—	—		10	0.0	1.8	0.2		10	0.0	0.5	0.1
Alcohol content																
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 3.7	10	0.00	0.50	0.15	max. 3.7	10	0.10	1.90	0.70	max. 3.7	10	1.00	1.90	1.48
Aromatics																
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Belgium

Quality		Super leaded(98)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	720-770	8	731.9	762.3	748.4	725 - 780	9	736.6	762.6	748.6	725 - 780	9	732.8	770.1	758.5
Lead content	mg/l	150	8	126	146	137	max. 13	9	< 2	< 2	< 2	max. 13	9	< 2	< 2	< 2
Distillation																
IBP	°C		8	28	36	31	---	9	28	34	31	---	9	30	33	31
5%	°C		---	---	---	---	---	---	---	---	---	---	---	---	---	---
10%	°C		8	40	55	46	---	9	40	51	47	---	9	44	53	48
20%	°C		8	49	67	56	---	9	50	61	57	---	9	53	66	59
30%	°C		8	60	79	68	---	9	62	73	69	---	9	65	81	73
40%	°C		8	76	92	82	---	9	76	87	82	---	9	80	97	90
50%	°C		8	90	106	96	---	9	96	104	99	---	9	100	112	107
60%	°C		8	100	118	109	---	9	108	120	111	---	9	117	122	119
70%	°C		8	109	131	121	---	9	118	135	124	---	9	124	134	130
80%	°C		8	119	145	135	---	9	133	149	139	---	9	134	147	143
90%	°C		8	140	161	154	---	9	156	164	159	---	9	149	164	159
95%	°C		8	158	175	169	---	9	164	175	169	---	9	161	177	169
FBP	°C		8	174	198	189	max. 215	9	179	196	190	max. 215	9	178	194	187
Residue	% v/v		8	1.0	2.0	1.3	max. 2	9	1.0	1.5	1.1	max. 2	9	1.0	1.5	1.3
Losses	% v/v		8	0.5	1.5	0.7	---	9	0.0	1.5	0.7	---	9	0.5	1.5	1.0
E70	% v/v	15-45	8	22.5	37.0	31.4	15 - 45	9	27.5	35.5	30.8	15 - 45	9	23.0	34.0	28.2
E100	% v/v	40-70	8	46.0	61.1	53.3	40 - 65	9	48.0	53.5	51.9	40 - 65	9	42.5	50.5	46.3
E150	% v/v	-	---	---	---	---	---	---	---	---	---	---	---	---	---	---
E180	% v/v	-	8	96.0	98.5	97.3	min. 85	9	96.0	98.5	97.6	min. 85	9	97.0	98.5	97.5
Sulphur content	mg/kg	max. 500	8	< 100	< 100	< 100	max. 500	4	100	300	150	max. 500	9	< 100	< 100	< 100
Octane Quality																
RON		97.5	8	98.6	100.9	99.6	min. 95.0	9	96.7	98.3	97.3	min. 98.0	9	98.4	100.8	99.3
MON		-	8	88.0	88.7	88.2	min. 85.0	9	85.1	85.4	85.2	min. 87.0	9	88.0	88.4	88.1
Reid Vapour Pressure	kPa		8	70	86	77	45-80	9	69	86	79	45-80	9	72	86	77
VLI (10*RVP + 7*E70)			---	---	---	---	max. 1050	9	884	1089	1000	max. 1050	9	881	1094	970
Gum unwashed	mg/100ml		8	3.0	124.0	37.1	-	9	2.0	64.0	28.4	-	9	10.0	60.0	35.4

Belgium

Quality		Super leaded(98)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v		8	27.4	43.7	37.2	—	9	32.5	43.0	37.5	—	9	32.5	51.1	44.0
Olefins	% v/v		8	6.7	17.9	11.8	—	9	10.2	18.9	15.6	—	9	2.8	9.9	6.0
Saturates	% v/v		8	38.7	64.4	49.7	—	9	38.0	52.2	46.8	—	9	39.2	58.7	47.9
GC-Analysis																
Benzene	% v/v		8	0.9	2.3	1.9	max. 3	9	1.2	2.4	1.7	max. 3	9	0.4	2.9	1.9
Ether content							max. 15					max. 15				
MTBE	% v/v		8	< 0.1	2.4	1.2		9	< 0.1	0.4	0.1		8	0.6	5.7	2.5
ETBE	% v/v		8	< 0.1	< 0.1	< 0.1		9	< 0.1	< 0.1	< 0.1		9	< 0.1	< 0.1	< 0.1
Alcohol content																
MeOH	% v/v		8	< 0.1	< 0.1	< 0.1	max. 3	9	< 0.1	< 0.1	< 0.1	max. 3	9	< 0.1	< 0.1	< 0.1
EtOH	% v/v		8	< 0.1	< 0.1	< 0.1	max. 5	9	< 0.1	< 0.1	< 0.1	max. 5	9	< 0.1	< 0.1	< 0.1
TBA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 7	9	< 0.1	< 0.1	< 0.1	max. 7	9	< 0.1	< 0.1	< 0.1
IPA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 5	9	< 0.1	< 0.1	< 0.1	max. 5	9	< 0.1	< 0.1	< 0.1
NBA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 7	9	< 0.1	< 0.1	< 0.1	max. 7	9	< 0.1	< 0.1	< 0.1
IBA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 7	9	< 0.1	< 0.1	< 0.1	max. 7	9	< 0.1	< 0.1	< 0.1
Oxygen content	% m/m		8	0.10	0.50	0.28	max. 2.5	9	< 0.10	0.20	0.04	max. 2.5	9	0.10	1.10	0.49
Aromatics																
Benzene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—

Denmark

Quality		Regular unleaded (92)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	710 - 750	4	733.6	744.6	738.4	730 - 770	23	740.7	764.5	754.4	730 - 780	20	758.9	771.6	766.2
Lead content	mg/l	max. 13	—	—	—	—	max. 13	—	—	—	—	max. 13	—	—	—	—
Distillation																
IBP	°C	—	—	—	—	—	—	11	28	31	30	—	10	27	30	29
5%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10%	°C	—	—	—	—	—	—	11	47	49	48	—	10	46	49	47
20%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50%	°C	—	—	—	—	—	—	11	88	111	99	—	10	92	113	109
60%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
70%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
90%	°C	—	—	—	—	—	—	11	146	163	155	—	10	148	162	155
95%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FBP	°C	—	—	—	—	—	—	20	180	196	187	—	16	182	191	188
Residue	% v/v	—	—	—	—	—	—	9	0.5	1.0	0.6	max. 2	6	0.5	1.0	0.6
Losses	% v/v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E70	% v/v	15 - 47	4	36.0	41.0	37.3	15 - 47	20	24.1	36.0	30.0	15 - 45	16	24.9	31.5	26.7
E100	% v/v	43 - 70	4	57.0	64.0	60.3	43 - 70	20	42.4	58.1	50.0	40 - 65	16	42.0	55.2	44.3
E150	% v/v	—	—	—	—	—	—	11	81.6	92.0	87.1	—	10	81.3	91.3	86.4
E180	% v/v	min. 85	—	—	—	—	min. 85	20	96.5	99.3	98.2	min. 85	16	97.0	99.5	98.1
Sulphur content	mg/kg	max.500	—	—	—	—	max. 500	7	24	70	47	max.500	9	1	34	13
Octane Quality																
RON		min. 92.0	4	92.0	92.4	92.1	min. 95.0	23	95.0	97.4	96.0	min. 98.0	20	98.0	100.2	99.0
MON		min. 83.0	4	83.2	83.9	83.5	min. 85.0	23	85.0	88.3	86.1	min. 88.0	20	87.5	89.5	88.5
Reid Vapour Pressure	kPa	45 - 80	4	80	80	80	45 - 80	20	72	80	78	45 - 80	16	69	82	78
VLI (10*RVP + 7*E70)		max.1200	4	1024	1087	1061	max. 1050	20	936	1052	988	max.1050	16	872	1012	967
Gum unwashed	mg/100ml	—	—	—	—	—	—	1	47.9	47.9	47.9	—	1	103.7	103.7	103.7

Denmark

Quality		Regular unleaded (92)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v	---	---	---	---	---	---	11	38.8	47.3	41.8	---	10	44.4	51.0	48.5
Olefins	% v/v	---	---	---	---	---	---	11	0.7	18.0	6.7	---	10	0.4	10.7	3.9
Saturates	% v/v	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
GC-Analysis																
Benzene	% v/v	max. 5	4	< 2.5	< 2.5	< 2.5	max. 5	20	1.6	2.9	2.4	max. 5	16	1.7	3.0	2.4
Ether content		max. 15					max. 15					max. 15				
MTBE	% v/v		4	< 0.1	< 0.1	< 0.1		18	0.0	1.9	0.4		14	0.1	8.4	6.3
ETBE	% v/v		---	---	---	---		---	---	---	---		---	---	---	---
Alcohol content																
MeOH	% v/v	max. 3	---	---	---	---	max. 3	---	---	---	---	max. 3	---	---	---	---
EtOH	% v/v	max. 5	---	---	---	---	max. 5	---	---	---	---	max. 5	---	---	---	---
TBA	% v/v	max. 7	---	---	---	---	max. 7	---	---	---	---	max. 7	---	---	---	---
IPA	% v/v	max. 5	---	---	---	---	max. 5	---	---	---	---	max. 5	---	---	---	---
NBA	% v/v	max. 7	---	---	---	---	max. 7	---	---	---	---	max. 7	---	---	---	---
IBA	% v/v	max. 7	---	---	---	---	max. 7	---	---	---	---	max. 7	---	---	---	---
Oxygen content	% m/m	max. 2.5	---	---	---	---	max. 2.5	---	---	---	---	max. 2.5	---	---	---	---
Aromatics																
Benzene	% m/m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Toluene	% m/m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Xylene	% m/m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Total	% m/m	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

Finland

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 780	7	739.8	759.9	748.5	725 - 780	5	755.1	767.8	762.1
Lead content	mg/l	max. 13	7	< 2	< 2	< 2	max. 13	5	< 2	< 2	< 2
Distillation											
IBP	°C	—	—	—	—	—	—	—	—	—	—
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	7	41	54	49	—	5	49	56	51
20%	°C	—	—	—	—	—	—	—	—	—	—
30%	°C	—	—	—	—	—	—	—	—	—	—
40%	°C	—	—	—	—	—	—	—	—	—	—
50%	°C	—	—	—	—	—	—	—	—	—	—
60%	°C	—	—	—	—	—	—	—	—	—	—
70%	°C	—	—	—	—	—	—	—	—	—	—
80%	°C	—	—	—	—	—	—	—	—	—	—
90%	°C	—	—	—	—	—	—	—	—	—	—
95%	°C	—	—	—	—	—	—	—	—	—	—
FBP	°C	max. 215	7	181	204	190	max. 215	5	179	207	189
Residue	% v/v	max. 2	7	1.0	1.3	1.2	max. 2	5	1.1	1.3	1.2
Losses	% v/v	—	—	—	—	—	—	—	—	—	—
E70	% v/v	15 - 45	7	22.5	40.5	29.2	15 - 45	5	20.2	28.4	24.9
E100	% v/v	40 - 65	7	47.6	65.6	56.7	40 - 65	5	44.0	50.8	47.9
E150	% v/v	—	—	—	—	—	—	—	—	—	—
E180	% v/v	min. 85	7	96.2	98.6	97.7	min. 85	5	96.3	98.0	97.6
Sulphur content	mg/kg	max. 500	7	< 50	100	34	max. 500	5	< 50	70	14
Octane Quality											
RON		min. 95.0	7	95.2	96.8	96.0	min. 98.0	5	99.3	99.7	99.5
MON		min. 85.0	7	85.3	86.1	85.7	min. 87.0	5	88.2	88.7	88.4
Reid Vapour Pressure	kPa	45-80	7	66	70	69	45-80	5	66	69	67
VLI (10*RVP + 7*E70)		max. 1050	7	858	944	893	max. 1050	5	811	869	850
Gum unwashed	mg/100ml	—	7	< 1.0	42.6	6.1	—	5	—	—	—

Finland

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	7	22.0	36.0	28.7	—	5	29.6	44.0	38.3
Olefins	% v/v	—	7	2.0	12.0	7.4	—	5	1.8	4.8	3.6
Saturates	% v/v	—	7	46.0	58.0	51.4	—	5	41.0	53.5	45.6
GC-Analysis											
Benzene	% v/v	max. 3	7	0.3	0.9	0.6	max. 3	5	0.4	0.9	0.5
Ether content		max. 15					max. 15				
MTBE	% v/v		7	1.2	12.7	8.0		5	11.6	14.2	12.4
ETBE	% v/v		—	—	—	—		—	—	—	—
Alcohol content											
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics											
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—

France

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 780	—	—	—	—	725 - 780	—	—	—	—
Lead content	mg/l	max. 13	—	—	—	—	max. 13	—	—	—	—
Distillation											
IBP	°C	—	20	28	35	31	—	21	28	34	30
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	20	47	54	50	—	21	48	57	51
20%	°C	—	20	54	67	61	—	21	59	69	64
30%	°C	—	20	60	85	73	—	21	68	86	77
40%	°C	—	20	70	103	87	—	21	78	101	92
50%	°C	—	20	83	118	101	—	21	89	118	105
60%	°C	—	20	102	129	115	—	21	101	129	116
70%	°C	—	20	117	139	128	—	21	115	138	127
80%	°C	—	20	130	151	140	—	21	130	147	138
90%	°C	—	20	146	167	157	—	21	144	159	152
95%	°C	—	20	156	182	170	—	21	152	173	163
FBP	°C	max. 215	20	176	208	193	max. 215	21	174	195	186
Residue	% v/v	max. 2	20	0.5	1.0	0.9	max. 2	21	0.5	1.0	0.9
Losses	% v/v	—	20	0.5	1.0	0.6	—	21	0.5	1.0	0.6
E70	% v/v	15 - 45	20	22.0	40.0	29.2	15 - 45	21	21.0	32.0	25.4
E100	% v/v	40 - 65	20	40.0	59.0	49.2	40 - 65	21	40.0	59.0	46.1
E150	% v/v	—	—	—	—	—	—	—	—	—	—
E180	% v/v	min. 85	20	95.0	99.0	97.2	min. 85	21	97.0	99.0	98.4
Sulphur content	mg/kg	max. 500	20	100	390	210	max. 500	21	20	90	56
Octane Quality											
RON		95.0	—	—	—	—	98.0	—	—	—	—
MON		85.0	20	84.6	85.6	85.2	87.0	21	87.7	88.3	88.1
Reid Vapour Pressure	kPa	35 - 70	20	58	69	63	35 - 70	21	60	68	64
VLI (10*RVP + 7*E70)		max. 900	20	775	897	835	max. 900	21	748	852	820
Gum unwashed	mg/100ml	—	—	—	—	—	—	—	—	—	—

France

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	20	26.3	52.7	41.1	—	21	34.3	60.2	48.2
Olefins	% v/v	—	20	7.9	22.6	14.8	—	21	0.9	19.4	7.1
Saturates	% v/v	—	20	31.6	57.2	44.1	—	21	25.4	58.0	44.7
GC-Analysis											
Benzene	% v/v	max. 5	20	0.8	3.7	2.3	max. 5	21	0.6	4.9	2.8
Ether content		max. 15					max. 15				
MTBE	% v/v		—	—	—	—	—	—	—	—	—
ETBE	% v/v		—	—	—	—	—	—	—	—	—
Alcohol content											
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics											
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—

Germany

Quality		Regular unleaded (91)					Super leaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 780	96	731.7	763.6	745.3	—	—	—	—	—
Lead content	mg/l	max. 13	96	0	1	1	—	—	—	—	—
Distillation											
IBP	°C	—	96	27	50	33	—	—	—	—	—
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	96	47	59	51	—	—	—	—	—
20%	°C	—	96	55	69	61	—	—	—	—	—
30%	°C	—	96	63	81	71	—	—	—	—	—
40%	°C	—	96	73	96	83	—	—	—	—	—
50%	°C	—	96	87	110	98	—	—	—	—	—
60%	°C	—	96	104	125	114	—	—	—	—	—
70%	°C	—	96	119	143	130	—	—	—	—	—
80%	°C	—	96	135	159	147	—	—	—	—	—
90%	°C	—	96	149	179	165	—	—	—	—	—
95%	°C	—	96	163	199	181	—	—	—	—	—
FBP	°C	max. 215	96	177	220	201	—	—	—	—	—
Residue	% v/v	max. 2	96	1.0	1.3	1.0	—	—	—	—	—
Losses	% v/v	—	96	0.2	2.9	1.4	—	—	—	—	—
E70	% v/v	15 - 45	96	22.5	37.7	30.0	—	—	—	—	—
E100	% v/v	40 - 65	96	44.6	58.0	51.7	—	—	—	—	—
E150	% v/v	—	96	75.4	91.6	83.2	—	—	—	—	—
E180	% v/v	min. 85	96	90.8	99.0	95.3	—	—	—	—	—
Sulphur content	mg/kg	max. 500	96	10	490	244	—	—	—	—	—
Octane Quality											
RON		min. 91.0	96	90.7	95.8	93.5	—	—	—	—	—
MON		min. 82.5	96	82.3	83.2	82.7	—	—	—	—	—
Reid Vapour Pressure	kPa	35 - 70	96	48	72	64	—	—	—	—	—
VLI (10*RVP + 7*E70)		max. 950	96	655	964	853	—	—	—	—	—
Gum unwashed	mg/100ml	—	96	1.0	300.0	41.1	—	—	—	—	—

Germany

Quality		Regular unleaded (91)					Super leaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	96	22.0	65.6	33.1	—	—	—	—	—
Olefins	% v/v	—	96	0.8	32.7	16.6	—	—	—	—	—
Saturates	% v/v	—	96	25.2	65.0	49.9	—	—	—	—	—
GC-Analysis											
Benzene	% v/v	max. 5	96	0.6	3.2	1.5	—	—	—	—	—
Ether content		max. 15									
MTBE	% v/v		96	0.0	2.9	0.3	—	—	—	—	—
ETBE	% v/v		96	0.0	0.0	0.0	—	—	—	—	—
Alcohol content											
MeOH	% v/v	max. 3	96	0.0	0.0	0.0	—	—	—	—	—
EtOH	% v/v	max. 5	96	0.0	0.0	0.0	—	—	—	—	—
TBA	% v/v	max. 7	96	0.0	1.8	0.1	—	—	—	—	—
IPA	% v/v	max. 5	96	0.0	0.0	0.0	—	—	—	—	—
NBA	% v/v	max. 7	96	0.0	0.0	0.0	—	—	—	—	—
IBA	% v/v	max. 7	96	0.0	0.0	0.0	—	—	—	—	—
Oxygen content	% m/m	max. 2.8	96	0.00	0.53	0.07	—	—	—	—	—
Aromatics											
Benzene	% m/m	—	96	0.7	3.7	1.8	—	—	—	—	—
Toluene	% m/m	—	96	3.8	15.2	8.5	—	—	—	—	—
Xylene	% m/m	—	96	4.6	16.6	10.4	—	—	—	—	—
Total	% m/m	—	96	23.5	49.3	34.9	—	—	—	—	—

Germany

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 780	96	733.4	772.3	755.6	725 - 780	80	728.8	785.4	759.7
Lead content	mg/l	max. 13	96	0	1	1	max. 13	80	0	1	1
Distillation											
IBP	°C	—	96	27	43	33	—	80	26	47	33
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	96	47	59	51	—	80	44	60	51
20%	°C	—	96	56	71	62	—	80	52	78	62
30%	°C	—	96	63	84	72	—	80	59	98	74
40%	°C	—	96	72	98	87	—	80	71	110	88
50%	°C	—	96	85	112	102	—	80	93	120	105
60%	°C	—	96	102	131	116	—	80	108	131	119
70%	°C	—	96	119	144	130	—	80	118	144	129
80%	°C	—	96	134	158	144	—	80	128	159	142
90%	°C	—	96	150	175	161	—	80	146	173	160
95%	°C	—	96	162	193	175	—	80	160	194	174
FBP	°C	max. 215	96	181	232	197	max. 215	80	179	223	197
Residue	% v/v	max. 2	96	1.0	1.5	1.0	max. 2	80	0.8	1.3	1.0
Losses	% v/v	—	96	0.2	3.9	1.3	—	80	0.3	2.7	1.3
E70	% v/v	15 - 45	96	19.9	36.5	28.6	15 - 45	80	18.9	37.9	28.1
E100	% v/v	40 - 65	96	42.0	58.1	49.7	40 - 65	80	34.1	55.0	47.7
E150	% v/v	—	96	76.3	91.4	85.0	—	80	76.0	96.2	85.5
E180	% v/v	min. 85	96	94.0	99.0	96.6	min. 85	80	94.4	98.8	96.8
Sulphur content	mg/kg	max. 500	96	10	280	106	max. 500	80	10	190	61
Octane Quality											
RON		min. 95.0	96	94.9	99.7	96.3	min. 98.0	80	97.4	102.2	99.3
MON		min. 85.0	96	84.4	86.0	85.2	min. 88.0	80	85.4	89.1	88.0
Reid Vapour Pressure	kPa	35 - 70	96	55	72	64	35 - 70	80	52	78	66
VLI (10*RVP + 7*E70)		max.950	96	741	945	843	max. 950	80	735	983	854
Gum unwashed	mg/100ml	—	96	1.0	100.0	46.2	—	80	1.0	120.5	48.4

Germany

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	96	28.7	56.8	40.3	—	80	17.4	72.9	40.7
Olefins	% v/v	—	96	0.9	20.5	9.2	—	80	1.0	11.7	4.9
Saturates	% v/v	—	96	32.2	60.3	48.7	—	80	11.2	63.0	47.9
GC-Analysis											
Benzene	% v/v	max.5	96	0.5	4.1	2.1	max. 1	80	0.3	2.0	0.8
Ether content		max. 15					max. 15				
MTBE	% v/v		96	0.0	9.6	1.6		80	0.0	13.6	6.2
ETBE	% v/v		96	0.0	0.0	0.0		80	0.0	0.0	0.0
Alcohol content											
MeOH	% v/v	max. 3	96	0.0	1.8	0.1	max. 3	80	0.0	0.5	0.0
EtOH	% v/v	max. 5	96	0.0	0.0	0.0	max. 5	80	0.0	0.0	0.0
TBA	% v/v	max. 7	96	0.0	2.5	0.1	max. 7	80	0.0	5.2	0.2
IPA	% v/v	max. 5	96	0.0	0.0	0.0	max. 5	80	0.0	0.0	0.0
NBA	% v/v	max. 7	96	0.0	0.0	0.0	max. 7	80	0.0	0.0	0.0
IBA	% v/v	max. 7	96	0.0	0.0	0.0	max. 7	80	0.0	0.0	0.0
Oxygen content	% m/m	max. 2.8	96	0.00	2.16	0.36	max. 2.8	80	0.00	2.65	1.21
Aromatics											
Benzene	% m/m	—	96	0.6	4.8	2.4	—	80	0.3	2.3	1.0
Toluene	% m/m	—	96	6.9	21.6	13.0	—	80	3.9	33.3	15.6
Xylene	% m/m	—	96	4.5	35.6	13.9	—	80	5.3	23.3	13.5
Total	% m/m	—	96	33.8	55.6	44.8	—	80	18.8	60.1	45.6

Great Britain

Quality		Super leaded					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec	n	Min.	Max.	Average	Spec	n	Min.	Max.	Average	Spec	n	Min.	Max.	Average
Density 15°C	Unit	---	32	721.0	751.1	736.4	725 - 780	32	729.3	765.2	745.5	725 - 780	23	739.7	778.7	756.7
Lead Content	mg/l	50 - 150	32	66	150	128	max 13	21	0	3	1	max 13	16	1	4	2
Distillation																
IBP	°C	---	32	23	35	31	---	32	25	35	31	---	23	26	35	31
5%	°C	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10%	°C	---	32	46	53	49	---	32	44	56	49	---	23	41	59	49
20%	°C	---	32	54	63	58	---	32	55	69	60	---	22	50	73	62
30%	°C	---	32	62	75	69	---	32	64	82	72	---	22	61	88	75
40%	°C	---	32	72	91	81	---	32	76	94	84	---	22	75	102	88
50%	°C	---	32	84	105	94	---	32	89	108	97	---	23	88	115	102
60%	°C	---	32	100	118	108	---	32	103	120	111	---	22	100	125	114
70%	°C	---	32	115	131	122	---	32	113	131	123	---	22	111	133	124
80%	°C	---	32	131	150	139	---	32	126	147	138	---	22	123	147	135
90%	°C	---	32	150	177	162	---	32	148	172	157	---	23	141	165	151
95%	°C	---	21	175	199	188	---	21	174	190	182	---	15	168	184	175
FBP	°C	max 215	32	184	213	200	max 215	32	182	210	196	max 215	23	170	209	189
Residue	% v/v	max 2	32	0.7	2.0	1.1	max 2	32	0.7	4.0	1.2	max 2	22	0.6	1.5	1.0
Losses	% v/v	---	32	0.2	3.0	1.7	---	32	0.5	4.0	2.4	---	22	0.8	4.1	2.4
E70	% v/v	15 - 45	32	27	39	32	15 - 45	32	21	37	30	15 - 45	23	19	37	28
E100	% v/v	40 - 65	32	46	61	55	40 - 65	32	45	59	53	40 - 65	23	39	62	49
E150	% v/v	---	32	80	92	87	---	32	84	93	88	---	22	83	95	91
E180	% v/v	min 85	32	91	98	95	min 85	32	92	98	96	min 85	22	94	99	98
Sulphur Content	mg/kg	max 2000	31	230	1000	558	max 500	32	80	700	303	max 500	23	10	400	180
Octane Quality																
RON		min 97.0	32	96.7	98.4	97.7	min 95.0	32	95.3	97.5	96.1	min 98.0	23	97.8	99.3	98.6
MON		min 86.0	32	86.1	87.1	86.6	min 85.0	32	84.7	86.7	85.4	min 87.0	23	86.6	88.0	87.4
Reid Vapour Pressure	kPa	45 - 80	32	70	89	75	45 - 80	32	60	81.5	73	45 - 80	23	66	83	75
VLI (10*RVP + 7*E70)		max 1050	32	908	1096	977	max 1050	32	747	1055	936	max 1050	23	802	1089	943
Gum unwashed	mg/100ml	max 5 washed	11	1	54	25	max 5 washed	11	17	52	35	max 5 washed	8	20	65	46

Great Britain

Quality		Super leaded					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec	n	Min.	Max.	Average	Spec	n	Min.	Max.	Average	Spec	n	Min.	Max.	Average
Density 15°C	Unit	—	32	721.0	751.1	736.4	725 - 780	32	729.3	765.2	745.5	725 - 780	23	739.7	778.7	756.7
FIA																
Aromatics	% v/v	—	11	16	35	28	—	11	24.7	41.2	33.0	—	8	29.1	55	40.3
Olefins	% v/v	—	11	7	20	15	—	11	4.9	12.2	8.6	—	8	0.8	11.4	5.2
Saturates	% v/v	—	11	53	67	57	—	11	52.5	66.2	58.4	—	8	41.6	61.1	54.5
GC - Analysis																
Benzene	% v/v	max 5	32	0.3	3.8	1.7	max 5	32	0.3	4.4	2.5	max 5	23	0.49	4.8	3.09
Ether content		max 10					max 10					max 10				
MTBE	% v/v		11	0	0.8	0.1		11	0	0.5	0.1		8	0	0.98	0.21
ETBE	% v/v		11	0	0	0		11	0	0	0		8	0	0	0
Alcohol content																
MeOH	% v/v	max 3	—	—	—	—	max 3	—	—	—	—	max 3	—	—	—	—
EtOH	% v/v	max 5	—	—	—	—	max 5	—	—	—	—	max 5	—	—	—	—
TBA	% v/v	max 7	—	—	—	—	max 7	—	—	—	—	max 7	—	—	—	—
IPA	% v/v	max 5	—	—	—	—	max. 5	—	—	—	—	max 5	—	—	—	—
NBA	% v/v	max 7	—	—	—	—	max 7	—	—	—	—	max 7	—	—	—	—
IBA	% v/v	max 7	—	—	—	—	max 7	—	—	—	—	max 7	—	—	—	—
Oxygen Content	% m/m	max 2.5	—	—	—	—	max 2.5	—	—	—	—	max 2.5	—	—	—	—
Aromatics																
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Greece

Quality		Super leaded (96)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	720 - 770	54	734.0	766.2	752.8	725 - 780	38	735.0	777.1	757.8	725 - 780	3	777.0	778.5	778.0
Lead content	mg/l	max. 150	54	80	170	133	max. 13	38	0	7	2	max. 13	3	1	3	2
Distillation																
IBP	°C	—	37	34	47	37	—	38	31	50	36	—	3	34	38	36
5%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10%	°C	—	37	48	61	54	—	27	53	63	57	—	1	61	61	61
20%	°C	—	37	55	72	63	—	27	61	76	66	—	1	74	74	74
30%	°C	—	37	63	84	73	—	27	71	90	76	—	1	85	85	85
40%	°C	—	17	78	89	83	—	17	81	90	86	—	—	—	—	—
50%	°C	—	36	90	110	100	—	27	92	114	101	—	1	113	113	113
60%	°C	—	17	105	119	113	—	17	105	121	112	—	—	—	—	—
70%	°C	—	33	122	134	128	—	26	118	143	130	—	—	—	—	—
80%	°C	—	17	139	179	148	—	17	133	149	141	—	—	—	—	—
90%	°C	—	37	146	170	157	—	27	152	173	162	—	1	171	171	171
95%	°C	—	33	154	186	170	—	25	165	190	175	—	1	187	187	187
FBP	°C	max. 215	44	174	209	186	max. 215	38	191	219	202	max. 215	3	210	215	212
Residue	% v/v	max. 2	43	0.6	1.4	1.0	max. 2	38	0.7	1.3	1.0	max. 2	3	1.0	1.2	1.1
Losses	% v/v		36	0.2	1.6	0.8	—	25	0.3	1.8	0.9	—	1	1.0	1.0	1.0
E70	% v/v	min. 10	44	19.0	36.5	27.2	15 - 45	38	15.0	29.8	24.7	15 - 45	3	16.0	17.0	16.5
E100	% v/v	30 - 65	44	42.5	58.0	49.0	40 - 65	38	40.5	57.2	49.6	40 - 65	3	40.0	42.0	41.0
E150	% v/v	—	17	79.3	86.3	82.3	—	17	81.0	89.5	85.7	—	—	—	—	—
E180	% v/v	min. 85	32	93.2	98.5	96.3	min. 85	38	92.0	97.5	95.3	min. 85	3	93.0	94.0	93.3
Sulphur content	mg/kg	max.1000	37	200	830	279	max. 500	38	90	230	116	max. 500	3	100	100	100
Octane Quality																
RON		96 - 98	54	96.0	96.3	96.1	min. 95.0	38	95.0	96.6	95.8	min. 98.0	3	98.0	98.0	98.0
MON		—	—	—	—	—	min. 85.0	—	—	—	—	min. 87.0	—	—	—	—
Reid Vapour Pressure	kPa	max. 62	54	51	64	59	35 - 70	38	58	68	63	35 - 70	3	55	61	58
VLI (10*RVP + 7*E70)		—	—	—	—	—	max. 900	38	705	871	800	max.900	3	554	722	697
Gum unwashed	mg/100ml	—	37	< 1	< 1	< 1	—	21	< 1	< 1	< 1	—	3	< 1	< 1	< 1

Greece

Quality		Super leaded (96)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v	—	43	17.0	48.3	41.6	—	6	20.0	38.5	34.8	—	—	—	—	—
Olefins	% v/v	—	43	0.2	22.3	3.6	—	6	10.5	13.0	11.3	—	—	—	—	—
Saturates	% v/v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
GC-Analysis																
Benzene	% v/v	max. 4	6	1.3	1.7	1.5	max. 4	27	1.6	3.3	2.9	max. 4	—	—	—	—
Ether content		max. 10					max. 10					max. 10				
MTBE	% v/v		37	0.0	1.6	0.2		27	3.3	4.0	3.5		3	8.0	8.0	8.0
ETBE	% v/v		37	0.0	0.0	0.0		—	—	—	—		—	—	—	—
Alcohol content																
MeOH	% v/v	max. 3	37	0.0	0.0	0.0	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	37	0.0	0.0	0.0	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	37	0.0	0.0	0.0	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	37	0.0	0.0	0.0	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	37	0.0	0.0	0.0	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	37	0.0	0.0	0.0	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	37	0.0	0.0	0.0	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics																
Benzene	% m/m	—	43	1.6	4.0	2.9	—	6	1.9	3.6	3.2	—	3	3.2	3.5	3.4
Toluene	% m/m	—	43	5.5	15.1	12.1	—	6	7.0	10.7	9.9	—	—	—	—	—
Xylene	% m/m	—	43	6.5	19.1	15.1	—	6	9.0	11.8	11.1	—	—	—	—	—
Total	% m/m	—	40	26.5	37.9	32.0	—	5	39.0	40.0	39.4	—	—	—	—	—

Hungary

Quality		Regular leaded (92)					Regular unleaded (91)					Super leaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	720 - 770	2	741.0	744.0	742.5	720 - 780	26	742.0	763.0	750.2	730 - 780	33	739.0	767.0	754.2
Lead content	mg/l	max. 150	2	90	120	105	max. 13	26	< 1	3	2	max. 150	33	30	140	107
Distillation																
IBP	°C	—	2	38	41	40	—	26	33	41	36	—	33	33	41	36
5%	°C	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—
10%	°C	—	2	54	56	55	—	15	49	58	52	—	15	51	60	55
20%	°C	—	2	63	63	63	—	15	57	68	60	—	14	62	72	67
30%	°C	—	2	71	72	72	—	15	65	79	70	—	14	74	84	80
40%	°C	—	2	80	83	82	—	15	76	92	82	—	14	85	97	93
50%	°C	—	2	92	96	94	—	15	90	107	97	—	15	98	109	106
60%	°C	—	2	106	111	109	—	15	108	121	114	—	14	109	120	116
70%	°C	—	2	124	128	126	—	15	127	136	132	—	14	121	134	129
80%	°C	—	2	144	147	146	—	15	145	154	150	—	14	139	152	147
90%	°C	—	2	167	166	168	—	15	165	177	170	—	15	164	171	167
95%	°C	—	2	184	190	187	—	15	178	197	188	—	14	177	189	182
FBP	°C	max. 215	2	200	202	201	max. 215	26	195	212	204	max. 215	33	192	210	202
Residue	% v/v	max. 2	2	—	—	—	max. 2	11	1.0	1.0	1.0	max. 2	18	1.0	2.0	1.1
Losses	% v/v	—	2	0.7	0.8	0.8	—	15	0.7	0.8	0.7	—	15	0.7	0.8	0.7
E70	% v/v	15 - 42	2	28.0	29.0	28.5	15 - 42	26	22.0	35.0	29.5	15 - 42	33	19.0	42.0	25.0
E100	% v/v	40 - 65	2	53.0	56.0	54.5	40 - 65	26	46.0	56.0	51.4	40 - 65	33	42.0	65.0	47.3
E150	% v/v	—	2	82.0	83.0	82.5	—	15	78.0	83.0	79.9	—	14	78.0	84.0	81.2
E180	% v/v	min. 85	2	93.0	95.0	94.0	min. 85	26	91.0	96.0	93.1	min. 85	33	91.0	96.0	94.3
Sulphur content	mg/kg	max.500	2	100	200	150	max. 500	26	< 100	340	120	max.500	15	< 100	250	156
Octane Quality																
RON		min. 92.0	2	92.5	94.0	93.3	min. 91.0	26	91.0	99.8	94.1	min. 98.0	15	97.8	100.8	99.0
MON		min. 83.0	2	83.5	84.0	83.8	min. 82.5	15	82.5	84.0	83.1	min. 88.0	15	88.0	89.0	88.5
Reid Vapour Pressure	kPa	45 - 70	2	59	65	62	45 - 70	15	47	68	62	45 - 70	15	58	81	66
VLI (10*RVP + 7*E70)		—	2	786	853	819	—	15	708	925	830	—	—	—	—	—
Gum. washed	mg/100ml	—	—	—	—	—	—	15	0.8	1.5	1.1	—	3	0.9	1.2	1.0

Hungary

Quality		Regular leaded (92)					Regular unleaded (91)					Super leaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v	—	—	—	—	—	—	2	41.4	44.2	42.8	—	2	34.8	35.0	34.9
Olefins	% v/v	—	—	—	—	—	—	2	14.4	14.4	14.4	—	2	8.2	8.3	8.3
Saturates	% v/v	—	—	—	—	—	—	2	41.4	44.2	42.8	—	2	56.8	57.1	57.0
GC-Analysis																
Benzene	% v/v	max. 3	2	1.4	1.7	1.6	max. 3	26	1.1	2.7	1.8	max. 3	33	1.1	2.7	1.8
Ether content		max. 15					max. 15					max. 15				
MTBE	% v/v		—	—	—	—		—	—	—	—		16	0.1	6.5	1.1
ETBE	% v/v		—	—	—	—		—	—	—	—		—	—	—	—
Alcohol content																
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics																
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	2	5.3	7.3	6.3	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	2	7.3	8.0	7.7	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Hungary

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	720 - 780	45	748.0	773.0	756.8	720 - 780	10	752.0	757.0	755.0
Lead content	mg/l	max. 13	45	< 1	3	1	max. 13	10	< 1	2	1
Distillation											
IBP	°C	—	45	26	40	35	—	10	36	38	37
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	15	51	57	54	—	4	55	56	55
20%	°C	—	15	61	69	65	—	4	64	67	65
30%	°C	—	15	70	82	76	—	4	74	79	76
40%	°C	—	15	80	95	90	—	4	85	91	87
50%	°C	—	15	94	108	103	—	4	97	104	100
60%	°C	—	15	108	124	117	—	4	111	115	113
70%	°C	—	15	121	140	131	—	4	124	127	125
80%	°C	—	15	138	154	149	—	4	141	145	143
90%	°C	—	15	159	175	168	—	4	163	166	165
95%	°C	—	15	170	200	184	—	4	177	183	180
FBP	°C	max. 215	45	193	215	203	max. 215	10	196	215	202
Residue	% v/v	max. 2	30	1.0	2.0	1.0	max. 2	6	1.0	1.0	1.0
Losses	% v/v	—	15	0.7	0.8	0.7	—	4	0.7	0.7	0.7
E70	% v/v	15 - 42	45	14.0	30.0	28.0	15 - 42	10	23.0	28.0	25.7
E100	% v/v	40 - 65	45	43.0	56.0	49.4	40 - 65	10	47.0	54.0	50.8
E150	% v/v	—	15	77.0	86.0	80.4	—	4	82.0	84.0	83.0
E180	% v/v	min. 85	45	92.0	98.0	94.2	min. 85	10	93.0	96.0	95.3
Sulphur content	mg/kg	max.500	45	< 100	200	75	max.500	10	< 100	100	28
Octane Quality											
RON		min. 95.0	45	95.0	99.8	96.9	min. 98.0	10	98.3	100.2	99.3
MON		min. 85.0	15	85.0	86.0	85.4	min. 88.0	4	88.0	88.5	88.1
Reid Vapour Pressure	kPa	45 - 70	15	62	70	66	45 - 70	4	56	68	64
VLI (10*RVP + 7*E70)		—	15	787	893	830	—	4	816	862	846
Gum. washed	mg/100ml	—	15	0.8	2.0	1.3	—	4	1.1	1.4	1.2

Hungary

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	2	35.9	37.9	36.9	—	2	38.6	39.6	39.1
Olefins	% v/v	—	2	8.9	11.1	10.0	—	2	7.4	7.6	7.5
Saturates	% v/v	—	2	53.0	53.2	53.1	—	2	52.8	54.0	53.4
GC-Analysis											
Benzene	% v/v	max. 3	45	0.6	2.7	1.6	max. 3	10	1.4	2.0	1.7
Ether content		max. 15					max. 15				
MTBE	% v/v		15	0.1	9.8	2.0		4	7.0	11.0	9.5
ETBE	% v/v		—	—	—	—		—	—	—	—
Alcohol content											
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics											
Benzene	% m/m	—	15	1.7	2.6	2.0	—	4	2.0	2.3	2.1
Toluene	% m/m	—	5	6.3	8.7	7.9	—	2	7.9	8.1	8.0
Xylene	% m/m	—	5	7.4	8.8	8.2	—	2	7.6	7.7	7.7
Total	% m/m	—	—	—	—	—	—	—	—	—	—

Italy

Quality		Super leaded (97)					Super unleaded (95)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 770	62	728.1	761.4	746.1	725 - 780	62	729.0	766.9	744.2
Lead content	mg/l	max. 150	62	100	150	126	max. 13	21	1	4	2
Distillation											
IBP	°C	—	62	30	37	33	—	62	29	37	34
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	62	45	59	53	—	62	45	59	52
20%	°C	—	62	51	71	62	—	62	52	72	61
30%	°C	—	62	57	84	72	—	62	56	84	71
40%	°C	—	62	64	97	84	—	62	63	97	82
50%	°C	—	62	74	111	98	—	62	73	109	96
60%	°C	—	62	87	128	113	—	62	89	125	110
70%	°C	—	62	104	143	127	—	62	111	141	124
80%	°C	—	62	120	157	143	—	62	124	155	140
90%	°C	—	62	140	175	163	—	62	143	172	161
95%	°C	—	62	157	201	179	—	62	156	196	176
FBP	°C	max. 220	62	177	222	201	max. 215	62	172	212	199
Residue	% v/v	max. 2	21	0.6	2.5	1.5	max. 2	21	0.5	2.0	1.1
Losses	% v/v	—	21	0.3	2.3	0.8	—	21	0.4	2.1	1.1
E70	% v/v	10 - 45	62	19.0	46.0	30.0	15 - 45	62	20.0	46.0	31.3
E100	% v/v	30 - 70	62	43.0	68.0	52.2	40 - 65	62	44.0	66.0	54.1
E150	% v/v	—	—	—	—	—	—	—	—	—	—
E180	% v/v	min. 85	61	94.0	99.0	96.4	min. 85	61	94.0	99.0	96.8
Sulphur content	mg/kg	max.2000	41	8	425	145	max. 500	41	3	368	126
Octane Quality											
RON		min. 97.0	62	96.3	99.3	98.1	min. 95.0	62	95.0	98.2	96.4
MON		min. 87.0	62	86.5	90.0	87.7	min. 85.0	62	85.0	86.5	86.1
Reid Vapour Pressure	kPa	40 - 73.5	62	45	73	63	35 - 70	62	44	71	63
VLI (10*RVP + 7*E70)		—	—	—	—	—	max. 900	62	645	999	841
Gum unwashed	mg/100ml	—	62	1.2	117.0	8.3	—	62	0.8	56.4	14.6

Italy

Quality		Super leaded (97)					Super unleaded (95)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	62	22.9	47.1	36.3	—	62	22.3	46.5	33.7
Olefins	% v/v	—	62	1.0	24.8	13.4	—	62	0.5	22.0	12.0
Saturates	% v/v	—	62	36.4	63.2	48.2	—	62	37.0	63.7	49.9
GC-Analysis											
Benzene	% v/v	max. 5	62	0.3	2.5	1.4	max. 5	62	0.3	3.1	1.1
Ether content		—					max. 15				
MTBE	% v/v		62	0.1	5.7	1.9		62	0.1	11.7	4.3
ETBE	% v/v		1	8.1	8.1	8.1		3	0.3	3.5	1.4
Alcohol content											
MeOH	% v/v	—	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	—	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	—	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	—	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	—	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	—	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	—	—	—	—	—	max. 2.5	—	—	—	—
Aromatics											
Benzene	% m/m	—	62	0.4	3.0	1.7	—	62	0.3	3.7	1.3
Toluene	% m/m	—	62	2.9	20.0	10.5	—	62	4.2	23.5	10.2
Xylene	% m/m	—	62	5.0	15.9	11.1	—	62	2.9	19.6	10.5
Total	% m/m	—	62	27.4	54.4	42.8	—	62	26.0	54.3	39.8

Netherlands

Quality		Super leaded					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³		8	731.8	759.5	741.9	725 - 780	8	736.7	756.1	743.4	725 - 780	8	737.8	764.0	747.4
Lead content	mg/l		8	112	140	129	max. 13	8	< 2	< 2	< 2	max. 13	8	< 2	< 2	< 2
Distillation																
IBP	°C		8	27	34	31	—	8	31	34	32	—	8	30	33	32
5%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
10%	°C		8	43	51	46	—	8	43	50	46	—	8	42	52	47
20%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
30%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
40%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
50%	°C		8	88	103	93	—	8	83	96	90	—	8	96	103	100
60%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
70%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
80%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
90%	°C		8	149	159	156	—	8	146	168	157	—	8	149	164	158
95%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
FBP	°C		8	188	211	198	max. 215	8	184	197	190	max. 215	8	186	200	191
Residue	% v/v		8	1.0	1.0	1.0	max. 2	8	0.9	1.2	1.0	max. 2	8	0.8	1.0	1.0
Losses	% v/v		8	0.5	2.0	1.3	—	8	0.2	2.5	1.2	—	8	0.3	1.2	0.8
E70	% v/v		8	29.0	34.6	32.3	15 - 45	8	29.7	40.8	36.0	15 - 45	8	25.0	36.4	31.2
E100	% v/v		8	48.2	57.9	54.5	40 - 65	8	52.0	62.1	56.0	40 - 65	8	48.4	51.6	49.8
E150	% v/v		—	—	—	—	—	—	—	—	—	—	—	—	—	—
E180	% v/v		8	94.5	98.2	96.3	min. 85	8	95.2	98.3	97.0	min. 85	8	97.1	98.3	97.6
Sulphur content	mg/kg		8	10	260	74	max. 500	8	20	120	50	max.500	8	10	80	36
Octane Quality																
RON			8	98.4	99.4	98.8	min. 95.0	8	95.6	97.6	96.3	min. 98.0	8	98.2	99.3	98.7
MON			8	88.0	88.2	88.1	min. 85.0	8	85.0	85.3	85.1	min. 87.0	8	88.0	88.2	88.1
Reid Vapour Pressure	kPa		8	69	87	78	45-80	8	75	80	77	45-80	8	68	85	76
VLI (10*RVP + 7*E70)			—	—	—	—	max. 1050	8	775	1190	1101	max. 1050	8	930	1205	1073
Gum unwashed	mg/100ml		8	9.0	44.0	29.3	—	8	20.0	49.0	30.4	—	8	26.0	44.0	33.4

Netherlands

Quality		Super leaded					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v		8	21.8	44.1	33.4	—	8	32.6	43.0	36.9	—	8	24.5	47.6	34.8
Olefins	% v/v		8	2.7	13.8	8.8	—	8	1.2	17.7	7.7	—	8	2.7	16.4	6.3
Saturates	% v/v		8	47.7	67.0	57.8	—	8	46.4	65.9	55.5	—	8	49.7	64.6	58.9
GC-Analysis																
Benzene	% v/v		8	0.6	3.6	1.9	max. 5	8	< 0.1	3.6	1.8	max. 5	8	0.3	2.6	1.2
Ether content							max. 15					max. 15				
MTBE	% v/v		8	0.0	4.2	1.2		8	< 0.1	2.2	0.8		8	< 0.1	10.5	5.4
ETBE	% v/v		8	< 0.1	< 0.1	< 0.1		8	< 0.1	< 0.1	< 0.1			< 0.1	< 0.1	< 0.1
Alcohol content																
MeOH	% v/v		8	< 0.1	< 0.1	< 0.1	max. 3	8	< 0.1	< 0.1	< 0.1	max. 3	8	< 0.1	< 0.1	< 0.1
EtOH	% v/v		8	< 0.1	< 0.1	< 0.1	max. 5	8	< 0.1	< 0.1	< 0.1	max. 5	8	< 0.1	< 0.1	< 0.1
TBA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 7	8	< 0.1	< 0.1	< 0.1	max. 7	8	< 0.1	< 0.1	< 0.1
IPA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 5	8	< 0.1	< 0.1	< 0.1	max. 5	8	< 0.1	< 0.1	< 0.1
NBA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 7	8	< 0.1	< 0.1	< 0.1	max. 7	8	< 0.1	< 0.1	< 0.1
IBA	% v/v		8	< 0.1	< 0.1	< 0.1	max. 7	8	< 0.1	< 0.1	< 0.1	max. 7	8	< 0.1	< 0.1	< 0.1
Oxygen content	% m/m		8	< 0.50	< 0.50	< 0.50	max. 2.5	8	< 0.50	< 0.50	< 0.50	max. 2.5	8	< 0.50	< 0.50	< 0.50
Aromatics																
Benzene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—

Norway

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 780	59	737.4	767.0	751.2	725 - 780	44	743.7	769.7	761.9
Lead content	mg/l	max. 13	—	—	—	—	max. 13	—	—	—	—
Distillation											
IBP	°C	—	18	27	33	29	—	10	27	32	29
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	7	45	51	48	—	7	44	51	48
20%	°C	—	—	—	—	—	—	—	—	—	—
30%	°C	—	—	—	—	—	—	—	—	—	—
40%	°C	—	—	—	—	—	—	—	—	—	—
50%	°C	—	7	83	109	99	—	7	92	114	103
60%	°C	—	—	—	—	—	—	—	—	—	—
70%	°C	—	—	—	—	—	—	—	—	—	—
80%	°C	—	—	—	—	—	—	—	—	—	—
90%	°C	—	7	146	166	155	—	7	148	160	153
95%	°C	—	—	—	—	—	—	—	—	—	—
FBP	°C	max. 215	53	188	215	203	max. 215	34	182	207	197
Residue	% v/v	max. 2	—	—	—	—	max. 2	—	—	—	—
Losses	% v/v	—	—	—	—	—	—	—	—	—	—
E70	% v/v	20 - 50	53	22.0	38.8	29.2	15 - 47	34	21.5	32.1	28.2
E100	% v/v	43 - 70	52	42.0	63.6	49.9	43 - 70	34	39.6	55.5	48.8
E150	% v/v	—	7	82.3	92.2	87.8	—	7	82.8	91.1	88.2
E180	% v/v	min. 85	53	92.6	98.6	95.5	min. 85	34	95.1	98.8	96.8
Sulphur content	mg/kg	max. 500	16	22	305	162	max. 500	15	16	205	82
Octane Quality											
RON		min. 95.0	59	94.9	98.5	95.9	min. 98.0	44	95.9	99.4	98.4
MON		min. 85.0	59	85.0	87.8	85.6	min. 87.0	44	85.8	88.7	87.6
Reid Vapour Pressure	kPa	55 - 90	53	69	86	82	55 - 90	34	68	86	82
VLI (10*RVP + 7*E70)		max.1100	53	933	1106	1022	max.1100	34	907	1051	1016
Gum unwashed	mg/100ml	—	4	37.9	64.9	49.8	—	4	36.6	60.2	48.0

Norway

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics*	% v/v	—	7	32.9	51.5	41.6	—	7	35.1	53.4	46.8
Olefins	% v/v	—	38	0.8	20.0	14.7	—	26	0.8	18.0	7.4
Saturates	% v/v	—	—	—	—	—	—	—	—	—	—
GC-Analysis											
Benzene	% v/v	max. 5	53	1.1	4.8	2.7	max. 5	34	1.6	4.8	3.0
Ether content		max. 15					max. 15				
MTBE	% v/v		22	<0.1	9.5	3.8		20	<0.1	9.9	5.1
ETBE	% v/v		—	—	—	—		—	—	—	—
Alcohol content											
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics											
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—

*Aromatics are not part of the specifications and so far not reported in every case.

Portugal

Quality		Super leaded					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³		11	759.4	769.8	764.9	725 - 780	8	748.7	767.2	761.0	725 - 780	12	760.1	780.0	771.1
Lead content	mg/l		11	114	150	133	max. 13	8	3	3	3	max. 13	12	3	5	3
Distillation																
IBP	°C		11	24	37	33	—	8	28	36	33	—	12	20	28	25
5%	°C		—	—	—	—	—	—	—	—	—	—	—	—	—	—
10%	°C		11	49	57	54	—	8	47	60	54	—	12	43	55	49
20%	°C		11	65	69	67	—	8	57	75	66	—	12	59	71	66
30%	°C		11	75	83	80	—	8	69	86	79	—	12	74	86	81
40%	°C		11	87	97	94	—	8	83	99	92	—	12	90	100	95
50%	°C		11	101	113	107	—	8	98	111	105	—	12	102	112	108
60%	°C		11	113	127	121	—	8	111	124	117	—	12	114	127	122
70%	°C		11	125	141	133	—	8	126	136	130	—	12	126	137	134
80%	°C		11	137	155	147	—	8	141	150	144	—	12	140	153	149
90%	°C		11	158	170	164	—	8	154	168	163	—	12	159	169	165
95%	°C		11	167	182	177	—	8	166	183	177	—	12	170	180	175
FBP	°C		11	193	202	198	max. 215	8	194	201	199	max. 215	12	181	198	194
Residue	% v/v		11	1.0	1.5	1.1	max. 2	8	1.0	2.0	1.2	max. 2	12	0.5	1.6	1.1
Losses	% v/v		11	1.0	2.0	1.8	—	8	1.0	1.8	1.2	—	12	1.0	1.7	1.3
E70	% v/v		11	20.5	26.1	22.6	15 - 45	8	17.9	32.0	23.7	15 - 45	12	19.5	27.5	22.8
E100	% v/v		11	40.5	49.6	44.2	40 - 65	8	40.5	50.5	45.6	40 - 65	12	40.0	48.5	43.3
E150	% v/v		11	77.0	88.0	82.1	—	8	80.0	88.0	83.9	—	12	78.0	85.0	81.0
E180	% v/v		11	94.0	98.2	95.7	min. 85	8	94.0	98.2	95.7	min. 85	12	95.0	98.0	96.4
Sulphur content	mg/kg		11	180	700	401	max. 500	8	200	500	380	max. 500	12	100	340	252
Octane Quality																
RON			11	98.0	98.9	98.4	min. 95.0	8	95.0	96.3	95.7	min. 98.0	12	98.0	98.6	98.2
MON			11	87.1	88.2	87.6	min. 85.0	8	85.0	85.8	85.3	min. 87.0	12	87.0	88.2	87.4
Reid Vapour Pressure	kPa		11	54	67	61	35 - 70	8	61	70	65	35 - 70	12	56	70	65
VLI (10*RVP + 7*E70)			—	—	—	—	max. 900	8	773	900	830	max. 900	12	704	850	808
Gum unwashed	mg/100ml		11	1.0	1.0	1.0	—	8	1.0	1.0	1.0	—	12	1.0	1.0	1.0

Portugal

Quality		Super leaded					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Olefins	% v/v		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Saturates	% v/v		—	—	—	—	—	—	—	—	—	—	—	—	—	—
GC-Analysis																
Benzene	% v/v		11	1.9	3.9	2.7	max. 5	8	1.7	3.6	2.8	max. 5	12	2.5	3.6	2.8
Ether content							max. 15					max. 15				
MTBE	% v/v		—	—	—	—		—	—	—	—		—	—	—	—
ETBE	% v/v		—	—	—	—		—	—	—	—		—	—	—	—
Alcohol content																
MeOH	% v/v		—	—	—	—	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v		—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v		—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v		—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v		—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v		—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m		—	—	—	—	max. 2.5	3	0.10	2.20	0.87	max. 2.5	—	—	—	—
Aromatics																
Benzene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—
Total	% m/m		—	—	—	—	—	—	—	—	—	—	—	—	—	—

Spain

Quality		Super leaded (97)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	720 - 780	8	746.9	775.8	763.4	725 - 780	8	745.0	769.0	759.4	725 - 780	5	746.4	778.2	768.2
Lead content	mg/l	max. 150	8	130	140	138	max. 13	8	1	3	2	max. 13	5	1	3	2
Distillation																
IBP	°C	—	8	31	39	35	—	—	—	—	—	—	—	—	—	—
5%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
20%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
30%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
40%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
60%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
70%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
80%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
90%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
95%	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
FBP	°C	max. 210	8	180	208	195	max. 215	8	177	203	197	max. 215	5	178	197	188
Residue	% v/v	max. 2	8	0.5	1.5	1.0	max. 2	8	0.6	1.5	1.2	max. 2	5	0.5	1.6	1.2
Losses	% v/v	max. 1.5	8	0.0	1.5	0.7	—	—	—	—	—	—	—	—	—	—
E70	% v/v	10 - 45	8	18.0	29.5	23.2	15 - 45	8	20.0	30.4	25.8	15 - 45	5	22.0	29.3	25.7
E100	% v/v	30 - 70	8	40.0	53.1	46.1	40 - 65	8	44.0	53.1	49.0	40 - 65	5	48.0	51.0	49.4
E150	% v/v	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
E180	% v/v	min. 80	8	95.0	98.9	96.6	min. 85	7	93.0	97.1	95.2	min. 85	5	94.0	99.0	96.7
Sulphur content	mg/kg	max. 1300	8	251	700	466	max. 500	8	267	500	378	max. 500	5	100	300	172
Octane Quality																
RON		min. 97.0	8	97.4	100.0	98.6	min. 95.0	8	95.0	98.1	96.4	min. 98.0	5	98.0	99.8	98.9
MON		min. 87.0	8	87.0	87.4	87.1	min. 85.0	8	85.0	85.2	85.1	—	5	86.7	88.2	87.5
Reid Vapour Pressure	kPa	48 - 64	8	56	64	61	35 - 70	8	56	68	63	35 - 70	5	59	68	64
VLI (10*RVP + 7*E70)		—	—	—	—	—	max. 900	8	758	878	810	max. 900	5	764	869	822
Gum washed	mg/100ml	max. 5	8	1.0	1.6	1.2	max. 5	8	0.8	1.4	1.1	max. 5	5	0.8	1.2	1.0

Spain

Quality		Super leaded (97)					Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA																
Aromatics	% v/v	—	8	33.6	53.3	45.2	—	8	34.1	50.4	43.9	—	5	34.3	57.8	51.2
Olefins	% v/v	—	8	9.5	19.1	13.5	—	8	7.1	16.7	12.5	—	5	0.7	9.3	5.3
Saturates	% v/v	—	8	33.6	48.0	41.3	—	8	35.0	50.5	43.6	—	5	33.9	56.5	43.5
GC-Analysis																
Benzene	% v/v	max. 5	8	1.9	3.3	2.5	max. 5	8	1.8	2.6	2.2	max. 5	5	1.7	3.1	2.6
Ether content		max. 15					max. 15					max. 15				
MTBE	% v/v		8	0.3	6.2	2.0		8	0.7	9.0	4.7		5	6.9	9.6	8.5
ETBE	% v/v		—	—	—	—		—	—	—	—		—	—	—	—
Alcohol content																
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics																
Benzene	% m/m	—	8	1.8	3.7	2.7	—	8	1.7	2.9	2.4	—	5	1.6	4.2	3.0
Toluene	% m/m	—	8	8.4	15.1	11.7	—	8	8.4	13.2	10.7	—	5	8.4	14.6	12.9
Xylene	% m/m	—	8	9.8	14.1	12.5	—	8	10.8	13.1	12.0	—	5	10.4	15.2	13.6
Total	% m/m	—	8	38.9	56.5	49.7	—	8	40.3	50.3	46.7	—	5	34.3	56.7	44.1

Sweden

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 775	50	733.7	756.6	750.9	725 - 775	34	738.5	767.9	758.1
Lead content	mg/l	max. 5	—	—	—	—	max. 5	—	—	—	—
Distillation											
IBP	°C	—	4	31	33	32	—	3	30	31	31
5%	°C	—	—	—	—	—	—	—	—	—	—
10%	°C	—	4	50	51	50	—	3	51	52	51
20%	°C	—	—	—	—	—	—	—	—	—	—
30%	°C	—	—	—	—	—	—	—	—	—	—
40%	°C	—	—	—	—	—	—	—	—	—	—
50%	°C	—	4	95	102	99	—	3	97	100	99
60%	°C	—	—	—	—	—	—	—	—	—	—
70%	°C	—	—	—	—	—	—	—	—	—	—
80%	°C	—	—	—	—	—	—	—	—	—	—
90%	°C	—	4	149	158	155	—	3	154	157	155
95%	°C	—	—	—	—	—	—	—	—	—	—
FBP	°C	max. 205	47	172	198	190	max. 205	30	178	201	189
Residue	% v/v	max. 2	43	0.5	1.2	1.0	max. 2	27	0.3	2.5	1.0
Losses	% v/v	—	—	—	—	—	—	—	—	—	—
E70	% v/v	15 - 45	47	24.8	38.0	30.3	15 - 45	30	24.0	35.6	29.6
E100	% v/v	min. 47	47	47.6	62.1	51.8	min. 47	30	47.0	53.5	49.5
E150	% v/v	—	4	85.5	90.6	87.0	—	3	85.8	87.5	86.9
E180	% v/v	min. 85	47	96.0	99.3	97.5	min. 85	30	96.0	99.0	97.8
Sulphur content	mg/kg	max. 100	46	< 1	< 100	<100	max. 100	31	< 1	< 100	0.7
Octane Quality											
RON		min. 95.0	50	95.0	97.7	95.6	min. 98.0	34	98.0	99.5	98.4
MON		min. 85.0	50	85.0	88.3	85.5	min. 87.0	34	87.5	89.0	88.0
Reid Vapour Pressure	kPa	45 - 70	46	65	70	69	45 - 70	34	57	70	68
VLI (10*RVP + 7*E70)		max. 1050	46	842	966	899	max. 1050	31	688	924	880
Gum unwashed	mg/100ml	—	—	—	—	—	—	7	45.6	107.1	65.4

Sweden

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	4	36.1	45.1	41.8	—	4	44.9	48.1	46.2
Olefins	% v/v	—	4	0.7	14.8	5.4	—	4	0.5	2.1	1.0
Saturates	% v/v	—	—	—	—	—	—	—	—	—	—
GC-Analysis											
Benzene	% v/v	max. 3	47	0.4	2.4	1.6	max. 3	31	0.3	2.4	1.4
Ether content		max. 15					max. 15				
MTBE	% v/v		47	< 0.5	1.1	< 0.5		34	0.1	12.1	6.0
ETBE	% v/v							—	—	—	—
Alcohol content											
MeOH	% v/v	max. 3	—	—	—	—	max. 3	—	—	—	—
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.0	—	—	—	—	max. 2.0	—	—	—	—
Aromatics											
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—

Switzerland

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
Density 15°C	kg/m³	725 - 780	20	726.5	746.7	735.7	725 - 780	17	730.5	753.1	741.7
Lead content	mg/l	max. 13	20	< 2	< 2	< 2	max. 13	17	< 2	< 2	< 2
Distillation											
IBP	°C	—	20	31	35	33	—	17	31	35	33
5%	°C	—	20	43	46	45	—	17	42	47	44
10%	°C	—	20	49	52	50	—	17	48	52	50
20%	°C	—	20	54	63	58	—	17	49	64	60
30%	°C	—	20	59	77	67	—	17	59	80	69
40%	°C	—	20	66	92	77	—	17	67	96	80
50%	°C	—	20	77	107	90	—	17	76	108	92
60%	°C	—	20	96	120	104	—	17	92	117	105
70%	°C	—	20	110	132	117	—	17	112	127	119
80%	°C	—	20	120	149	132	—	17	130	143	133
90%	°C	—	20	139	169	153	—	17	146	161	153
95%	°C	—	20	152	186	167	—	17	156	199	168
FBP	°C	max. 215	20	171	216	193	max. 215	17	180	202	191
Residue	% v/v	max. 2	20	0.6	1.1	1.0	max. 2	17	0.8	1.1	0.9
Losses	% v/v	—	20	0.4	1.1	0.8	—	17	0.7	1.4	1.0
E70	% v/v	15 - 45	20	25.3	44.4	34.0	15 - 45	17	23.8	44.0	32.1
E100	% v/v	40 - 65	20	45.2	62.1	57.0	40 - 65	17	43.0	64.1	61.9
E150	% v/v	—	—	—	—	—	—	—	—	—	—
E180	% v/v	min. 85	20	93.6	98.9	96.9	min. 85	17	95.4	99.0	97.1
Sulphur content	mg/kg	max. 500	20	100	470	216	max. 500	17	80	230	161
Octane Quality											
RON		min. 95.0	20	95.1	96.7	95.8	min. 98.0	17	97.6	99.3	98.4
MON		min. 85.0	20	85.4	87.0	85.8	min. 88.0	17	88.2	89.0	88.6
Reid Vapour Pressure	kPa	35 - 70	20	62	69	69	35 - 70	17	61	76	67
VLI (10*RVP + 7*E70)		max. 950	20	824	950	906	max. 950	17	839	961	895
Gum unwashed	mg/100ml	—	20	1.0	65.0	19.5	—	—	1.0	78.0	23.5

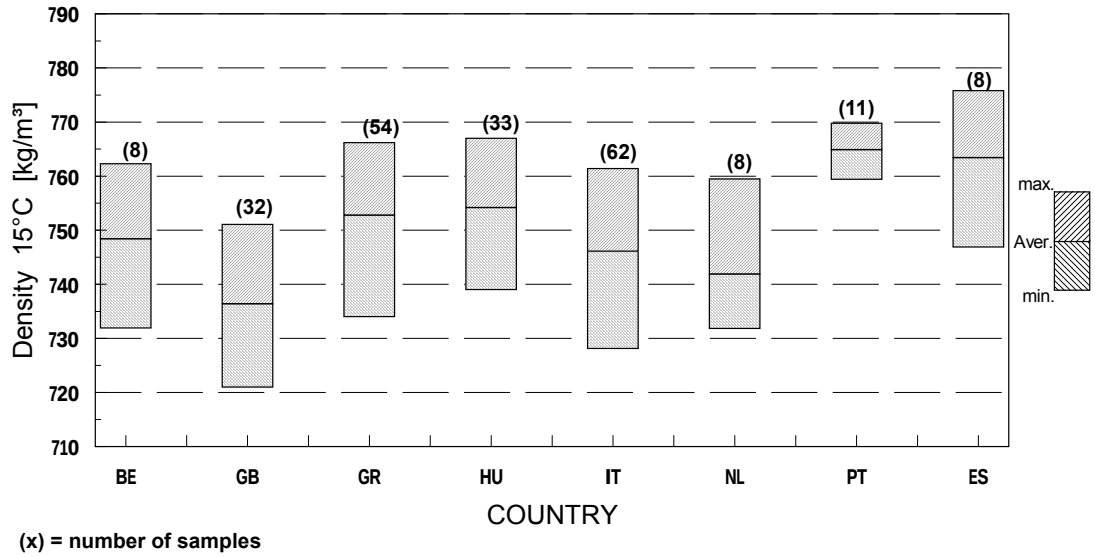
Switzerland

Quality		Super unleaded (95)					Super unleaded (98)				
Property	Unit	Spec.	n	Min.	Max.	Average	Spec.	n	Min.	Max.	Average
FIA											
Aromatics	% v/v	—	20	22.1	36.3	28.6	—	17	21.5	38.2	30.9
Olefins	% v/v	—	20	0.3	15.6	9.3	—	17	0.6	10.6	4.4
Saturates	% v/v	—	—	—	—	—	—	—	—	—	—
GC-Analysis											
Benzene	% v/v	max. 5	20	1.0	2.9	2.0	max.5	17	0.6	3.0	1.6
Ether content		max. 15					max. 15				
MTBE	% v/v		20	< 0.1	5.9	2.5		17	< 0.1	12.0	10.4
ETBE	% v/v		—	—	—	—		—	—	—	—
Alcohol content											
MeOH	% v/v	max. 3	20	< 0.1	< 0.1	< 0.1	max. 3	17	< 0.1	< 0.1	< 0.1
EtOH	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
TBA	% v/v	max. 7	20	< 0.1	0.5	< 0.1	max. 7	17	< 0.1	0.4	< 0.1
IPA	% v/v	max. 5	—	—	—	—	max. 5	—	—	—	—
NBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
IBA	% v/v	max. 7	—	—	—	—	max. 7	—	—	—	—
Oxygen content	% m/m	max. 2.5	—	—	—	—	max. 2.5	—	—	—	—
Aromatics											
Benzene	% m/m	—	—	—	—	—	—	—	—	—	—
Toluene	% m/m	—	—	—	—	—	—	—	—	—	—
Xylene	% m/m	—	—	—	—	—	—	—	—	—	—
Total	% m/m	—	—	—	—	—	—	—	—	—	—

APPENDIX 5

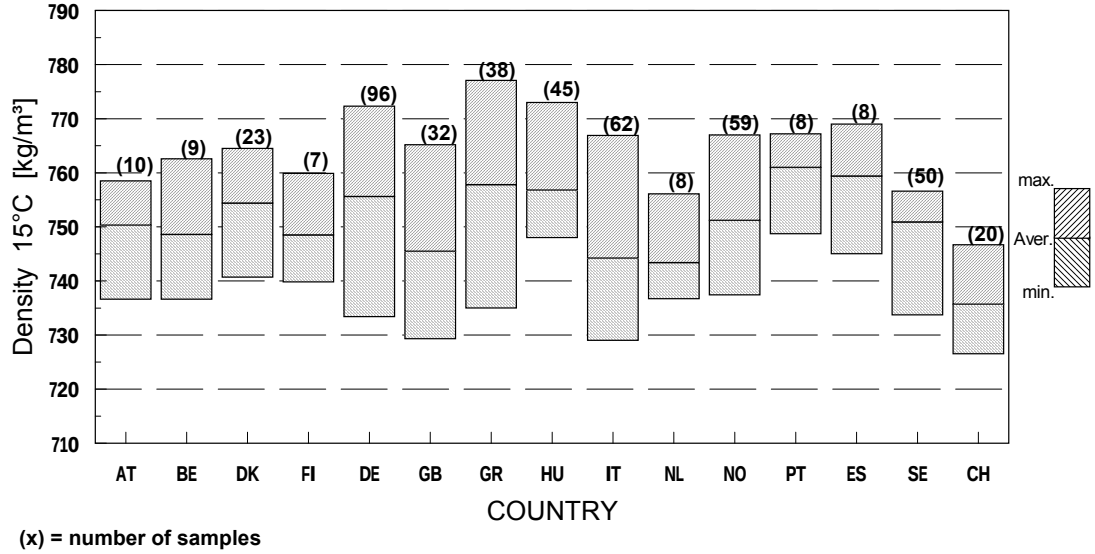
KEY PARAMETERS

Figure 1 Density at 15°C of super leaded



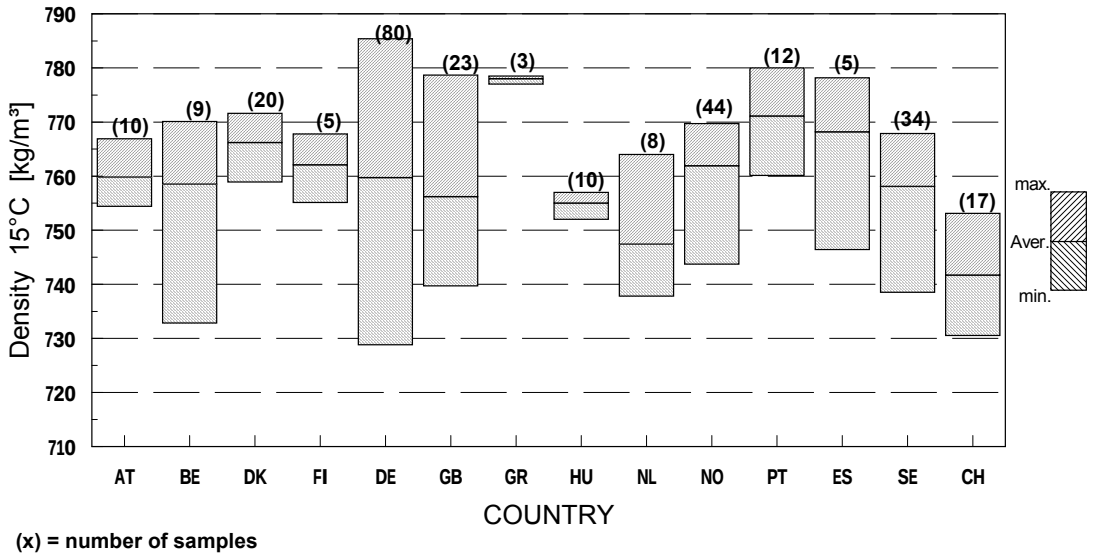
(x) = number of samples

Figure 2 Density at 15°C of super unleaded (95)



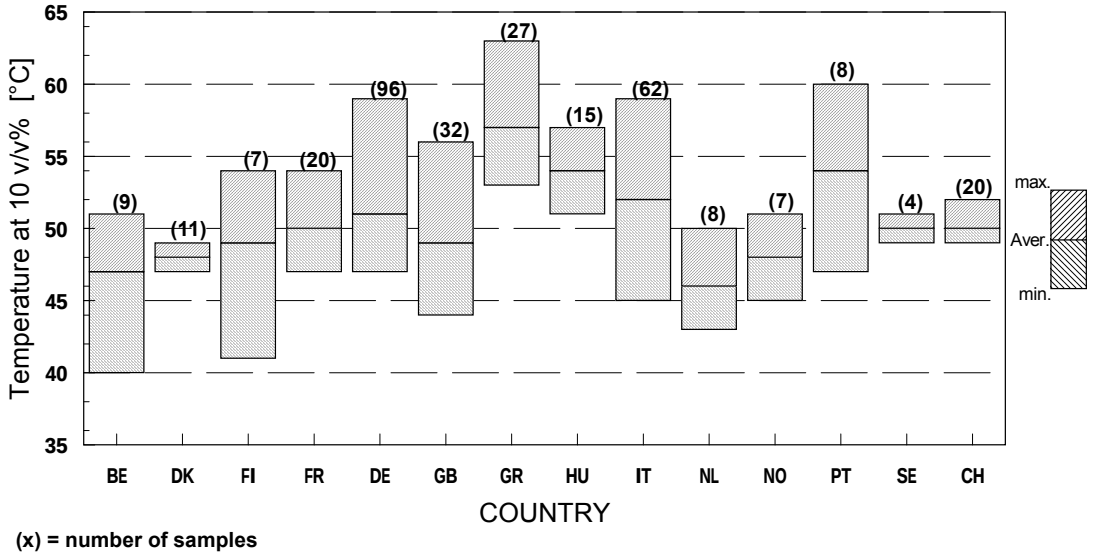
(x) = number of samples

Figure 3 Density at 15°C of super unleaded (98)



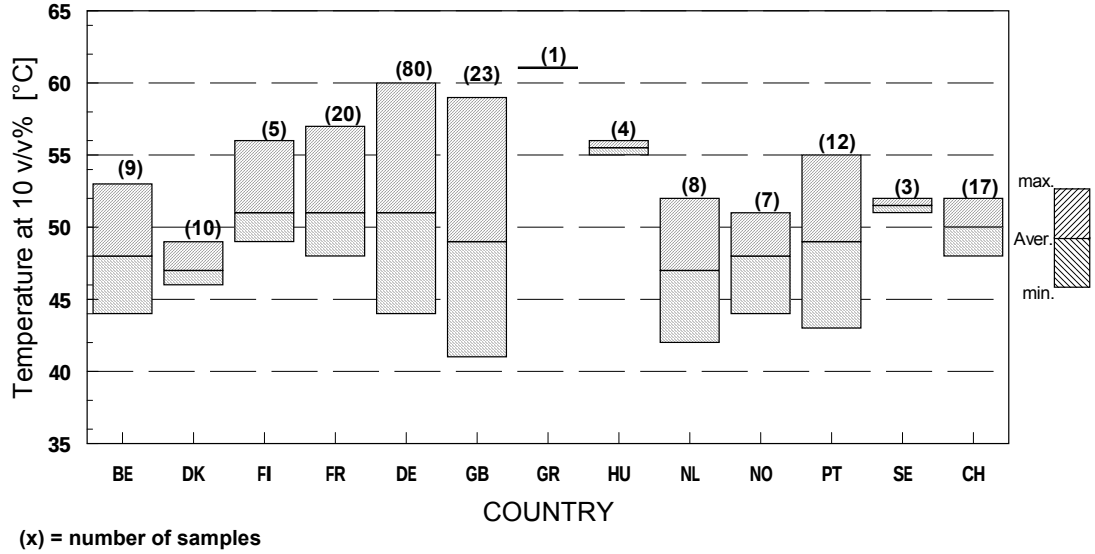
(x) = number of samples

Figure 4 Distillation characteristics of super unleaded (95)
Temperature (°C) at which **10%** is evaporated



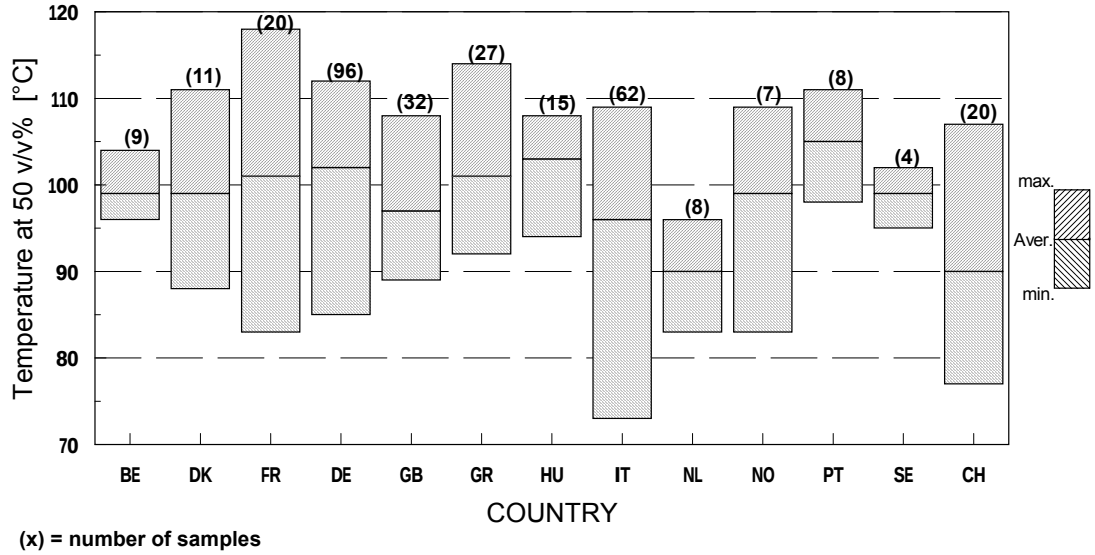
(x) = number of samples

Figure 5 Distillation characteristics of super unleaded (98)
Temperature (°C) at which **10%** is evaporated



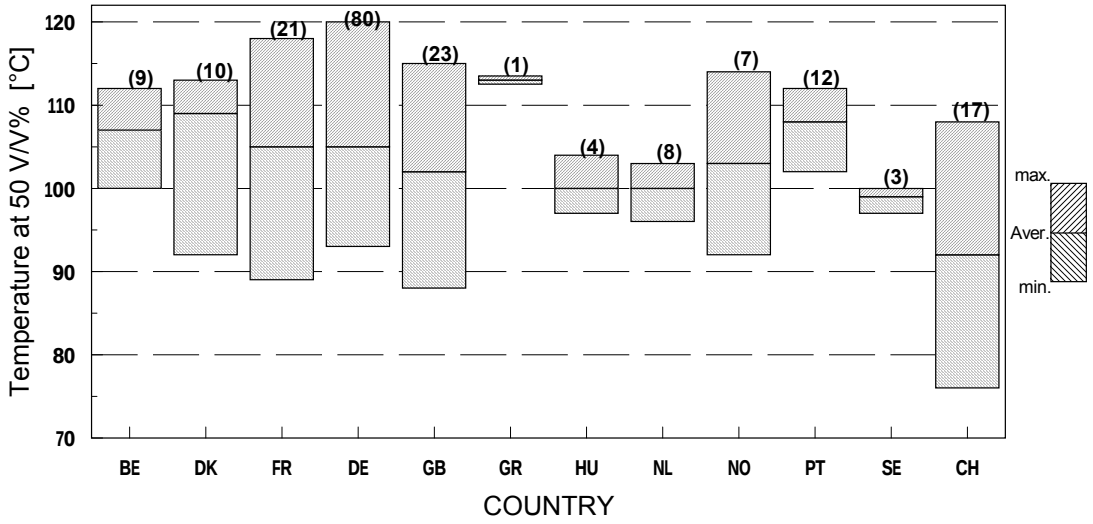
(x) = number of samples

Figure 6 Distillation characteristics of super unleaded (95)
Temperature (°C) at which **50%** is evaporated



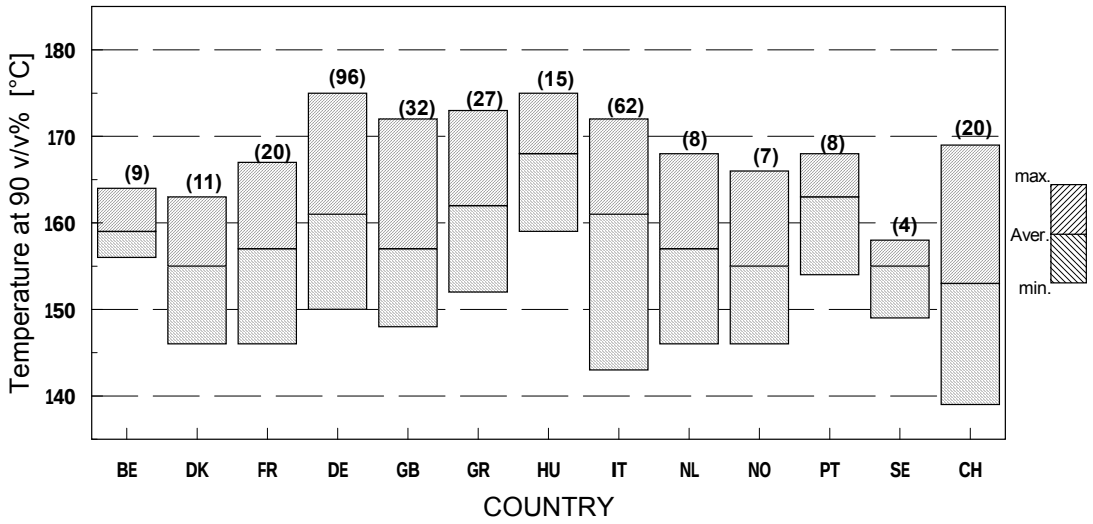
(x) = number of samples

Figure 7 Distillation characteristics of super unleaded (98)
Temperature (°C) at which **50%** is evaporated



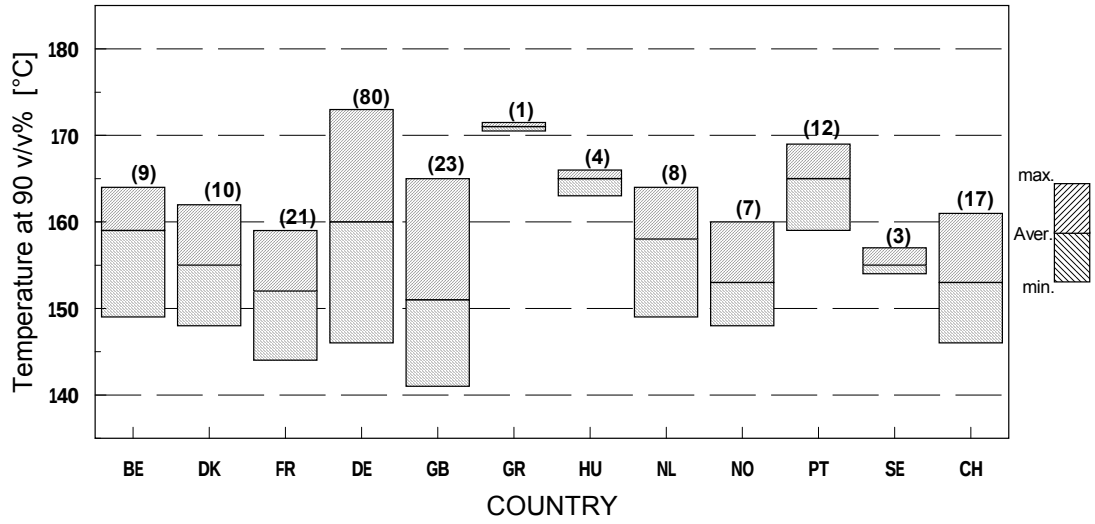
(x) = number of samples

Figure 8 Distillation characteristics of super unleaded (95)
Temperature (°C) at which **90%** is evaporated



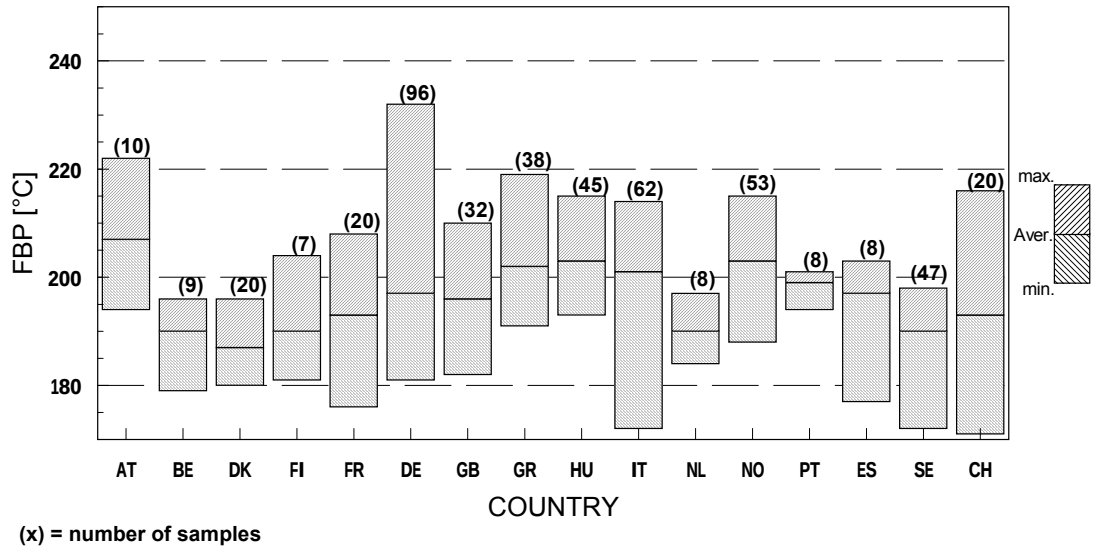
(x) = number of samples

Figure 9 Distillation characteristics of super unleaded (98)
Temperature (°C) at which **90%** is evaporated



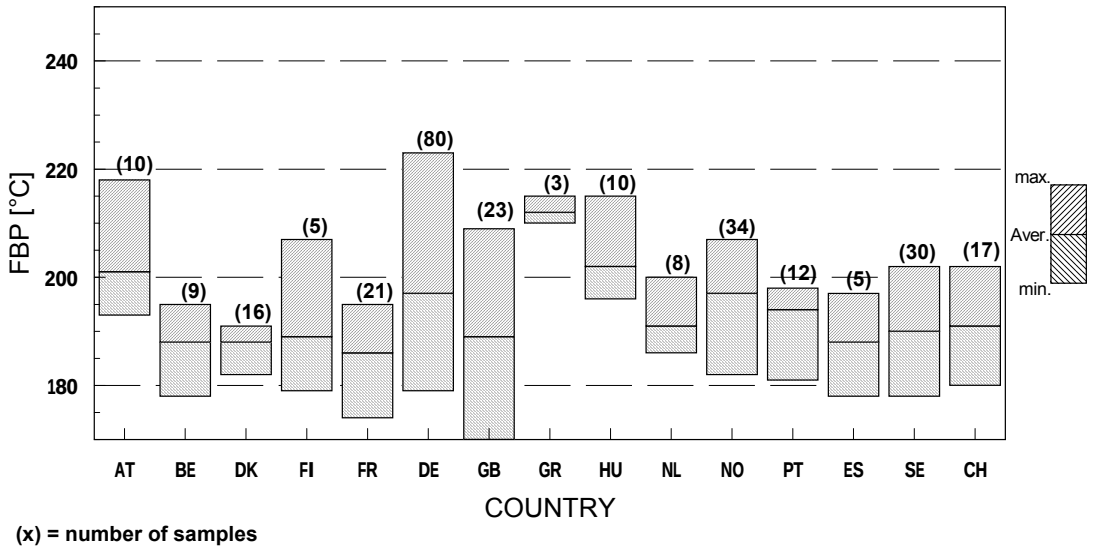
(x) = number of samples

Figure 10 Distillation characteristics of super unleaded (95)
Final boiling point (°C)



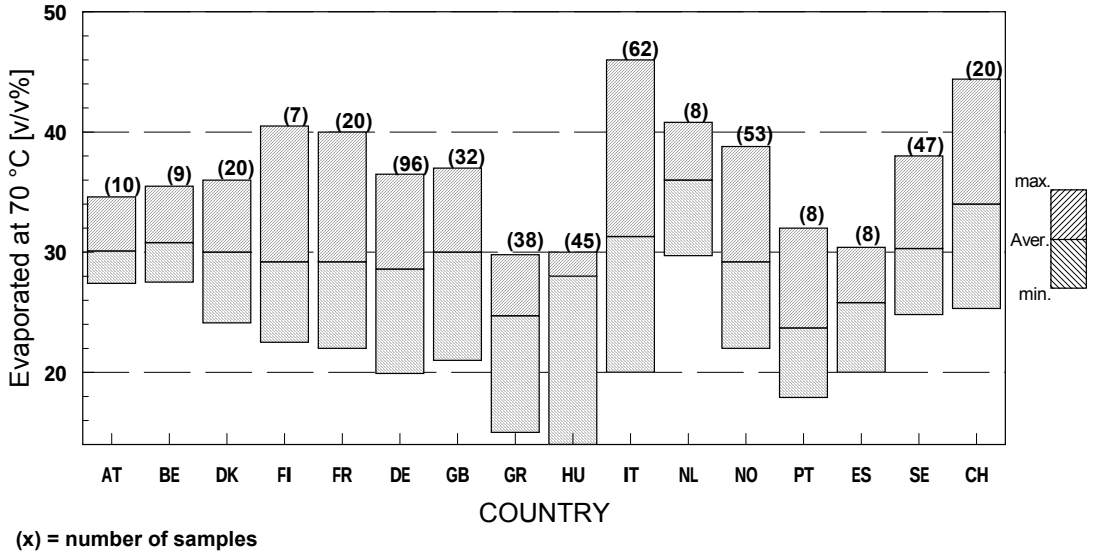
(x) = number of samples

Figure 11 Distillation characteristics of super unleaded (98)
Final boiling point (°C)



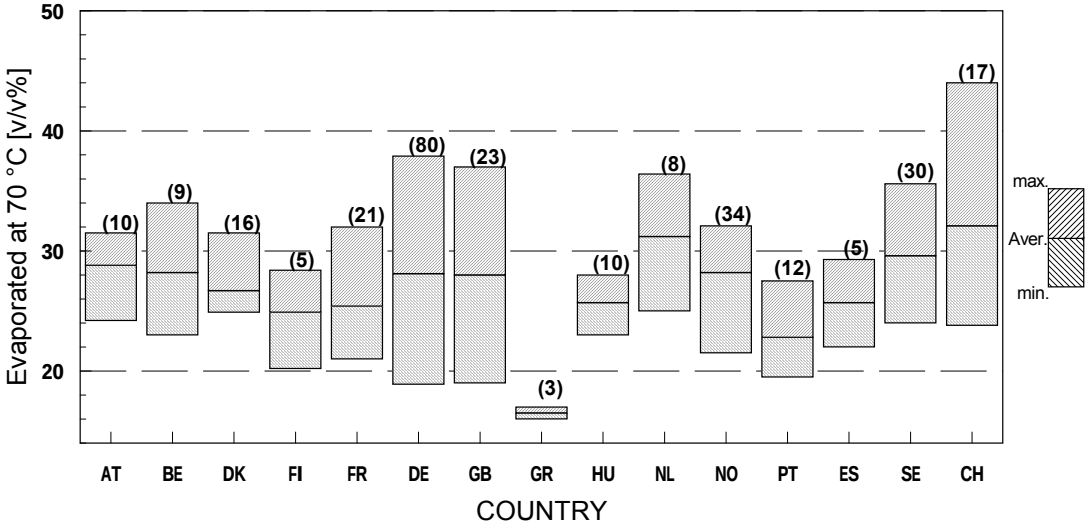
(x) = number of samples

Figure 12 Distillation characteristics of super unleaded (95)
Volume (%) evaporated at **70°C**



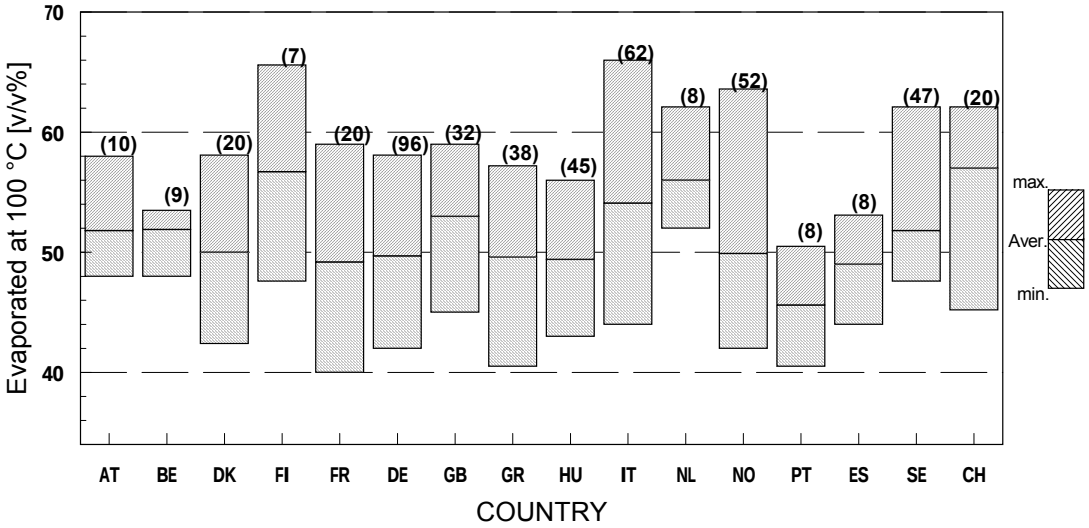
(x) = number of samples

Figure 13 Distillation characteristics of super unleaded (98)
Volume (%) evaporated at **70°C**



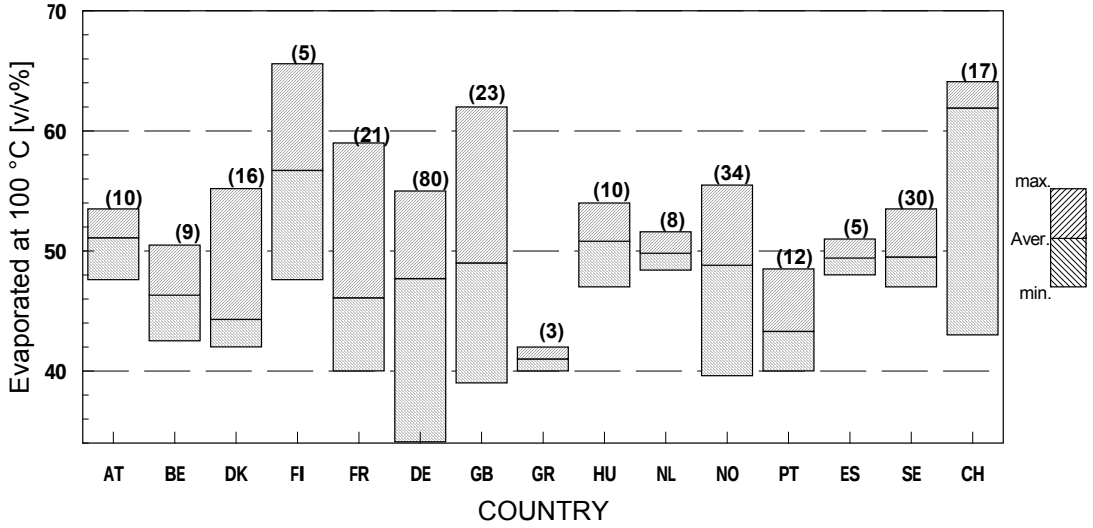
(x) = number of samples

Figure 14 Distillation characteristics of super unleaded (95)
Volume (%) evaporated at **100°C**



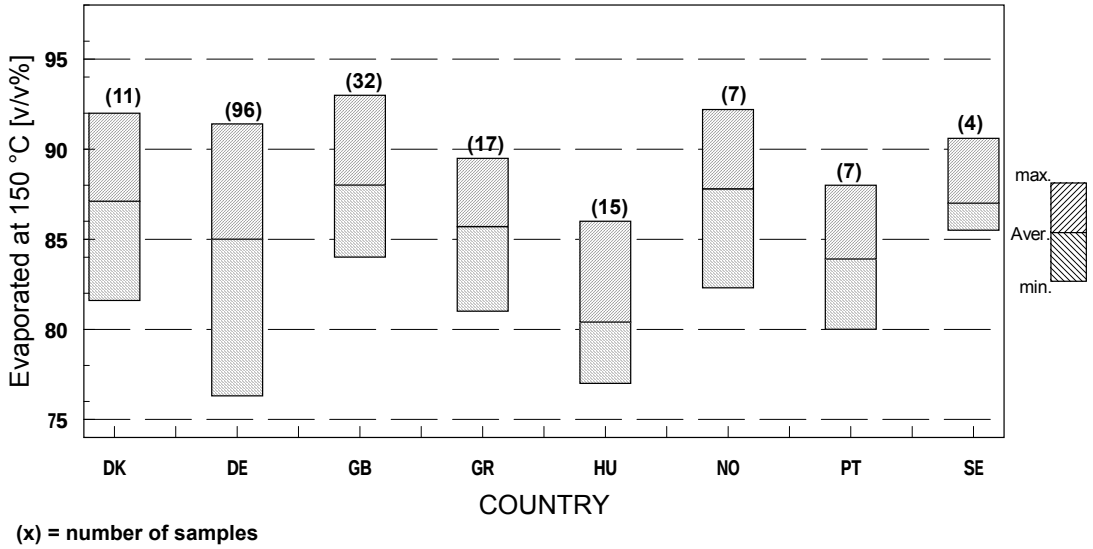
(x) = number of samples

Figure 15 Distillation characteristics of super unleaded (98)
Volume (%) evaporated at **100°C**



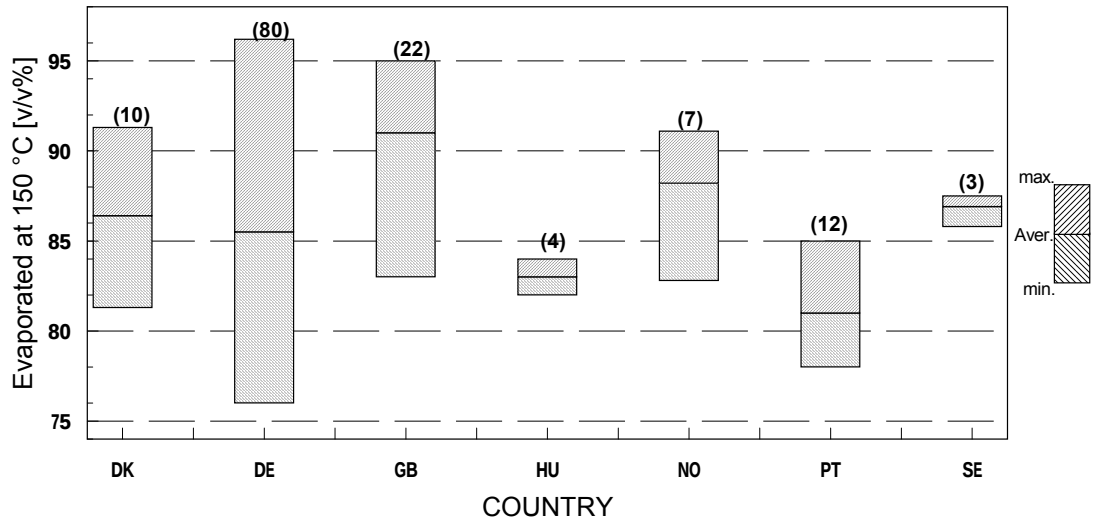
(x) = number of samples

Figure 16 Distillation characteristics of super unleaded (95)
Volume (%) evaporated at **150°C**



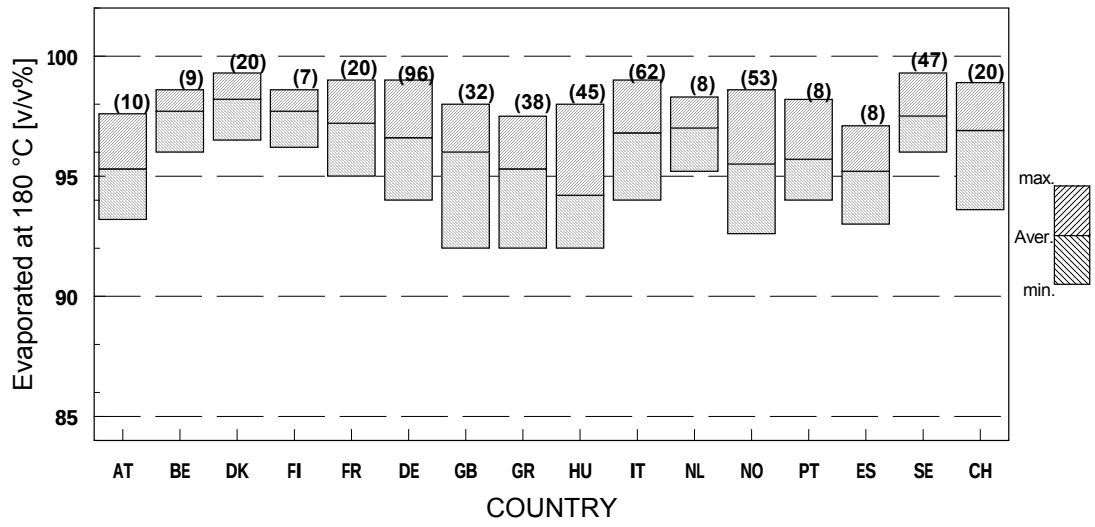
(x) = number of samples

Figure 17 Distillation characteristics of super unleaded (98)
Volume (%) evaporated at **150°C**



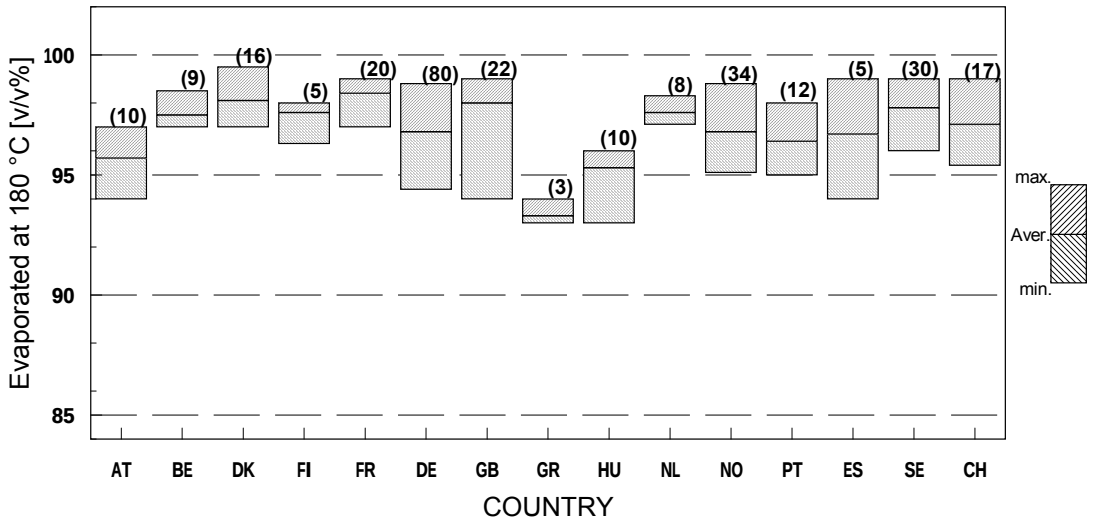
(x) = number of samples

Figure 18 Distillation characteristics of super unleaded (95)
Volume (%) evaporated at **180°C**



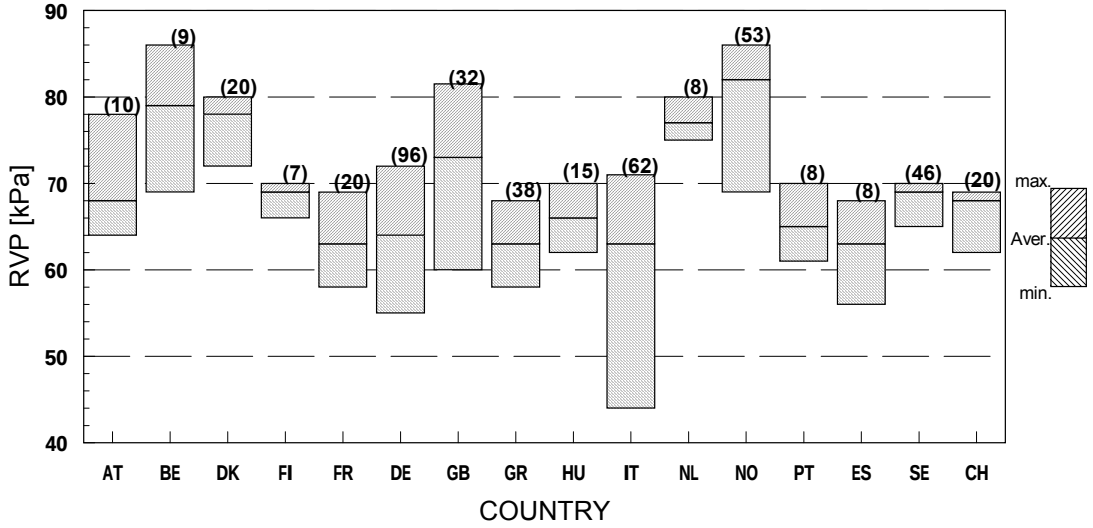
(x) = number of samples

Figure 19 Distillation characteristics of super unleaded (98)
Volume (%) evaporated at **180°C**



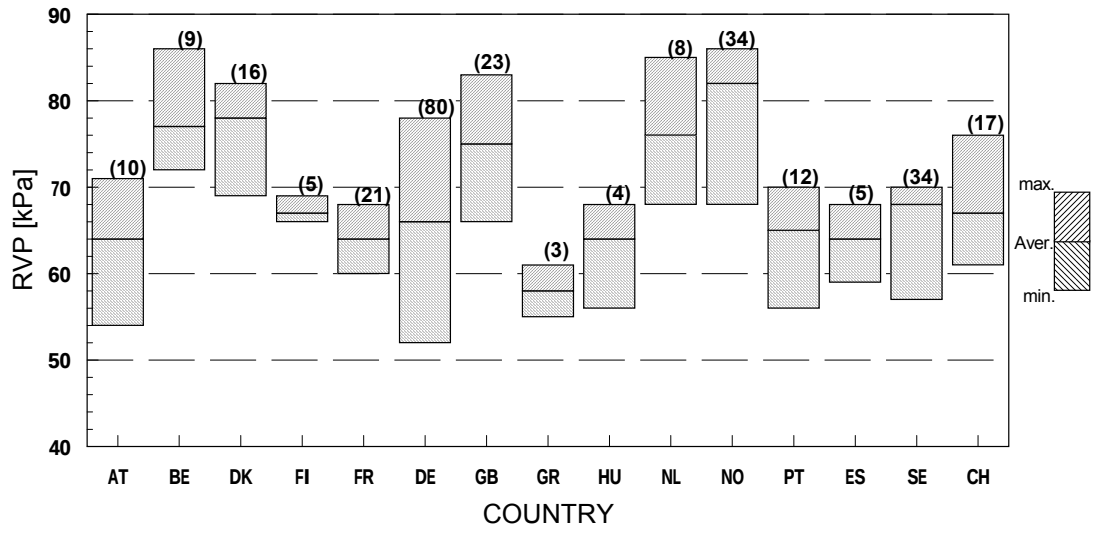
(x) = number of samples

Figure 20 RVP (kPa) of super unleaded (95)



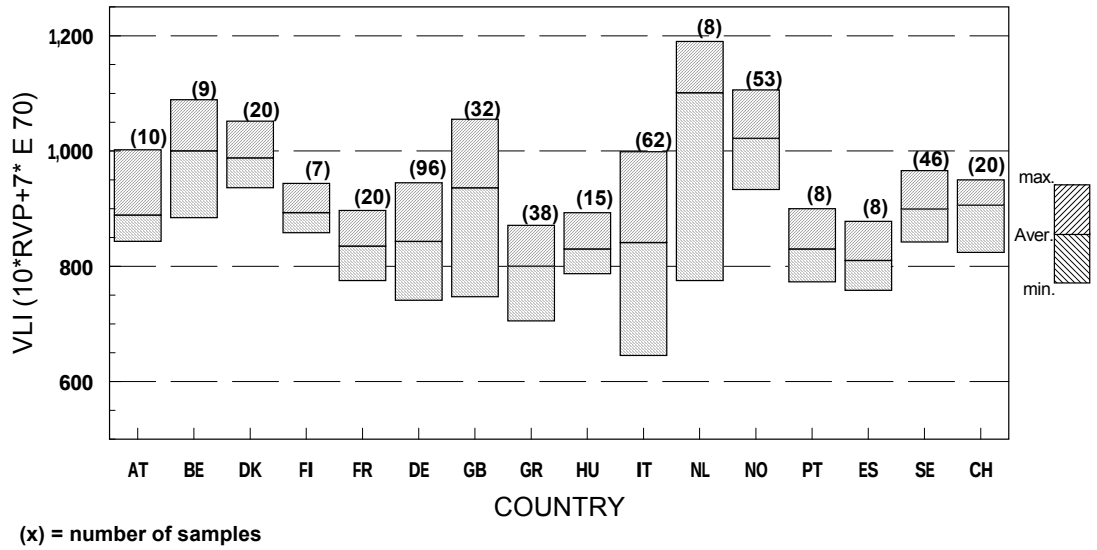
(x) = number of samples

Figure 21 RVP (kPa) of super unleaded (98)



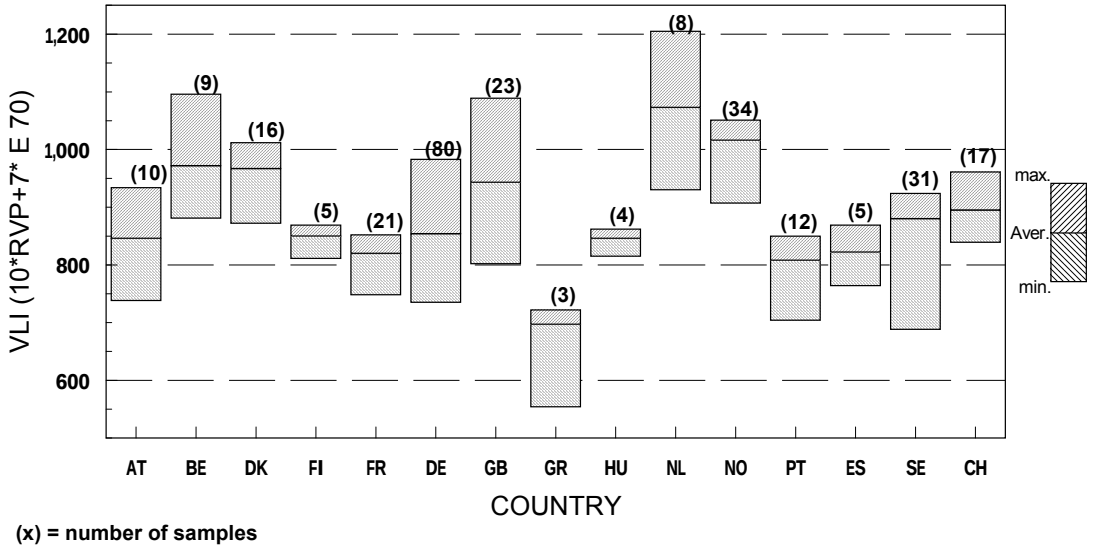
(x) = number of samples

Figure 22 VLI of super unleaded (95)



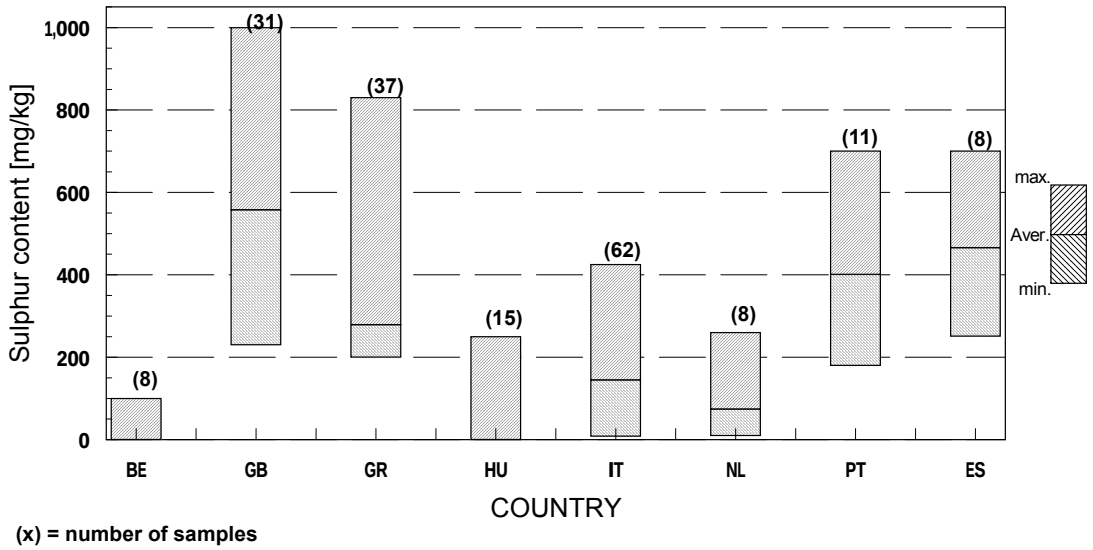
(x) = number of samples

Figure 23 VLI of super unleaded (98)



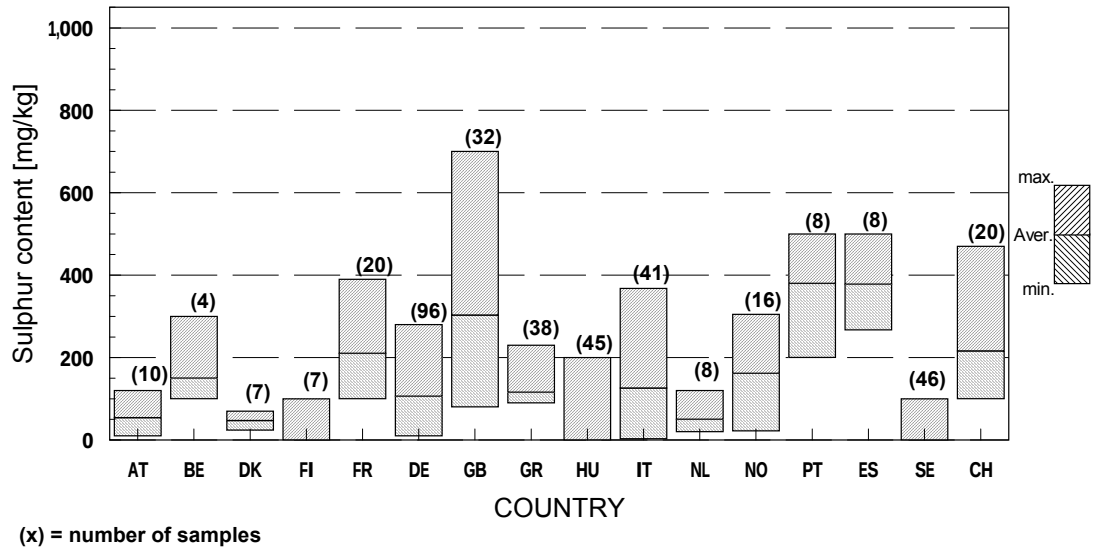
(x) = number of samples

Figure 24 Sulphur content (mg/kg) of super leaded



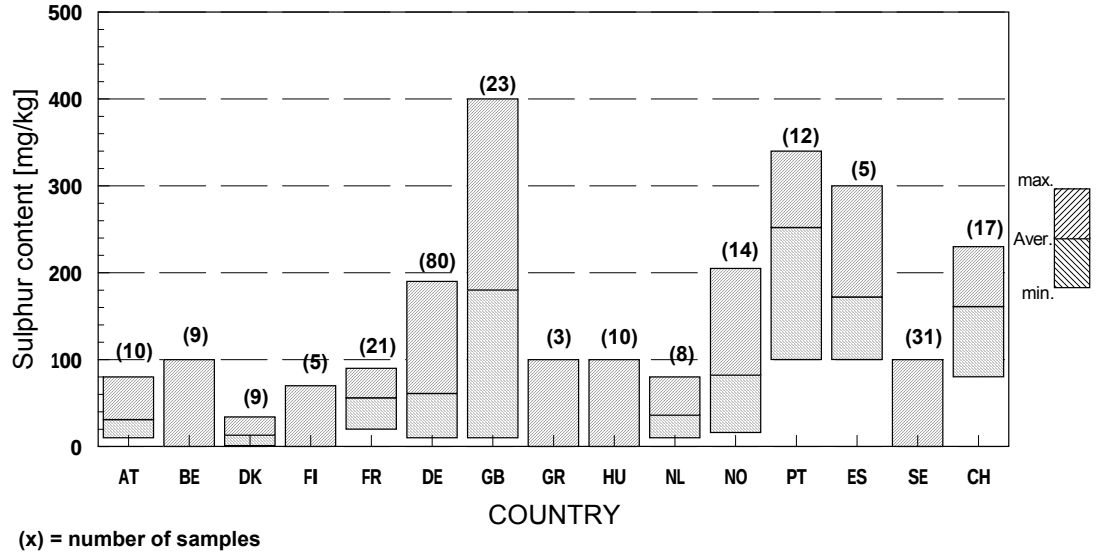
(x) = number of samples

Figure 25 Sulphur (mg/kg) content of super unleaded (95)



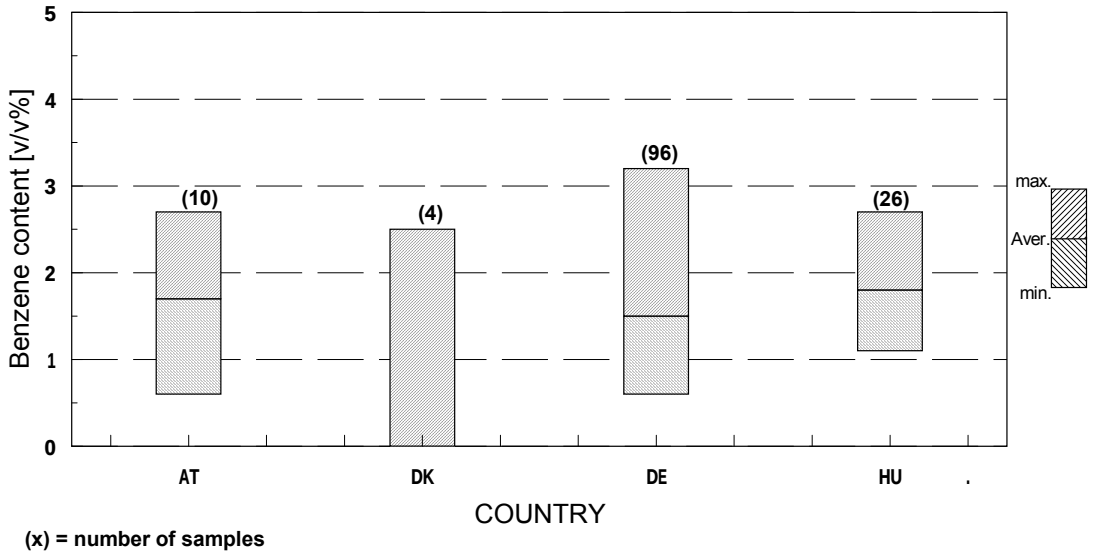
(x) = number of samples

Figure 26 Sulphur content (mg/kg) of super unleaded (98)



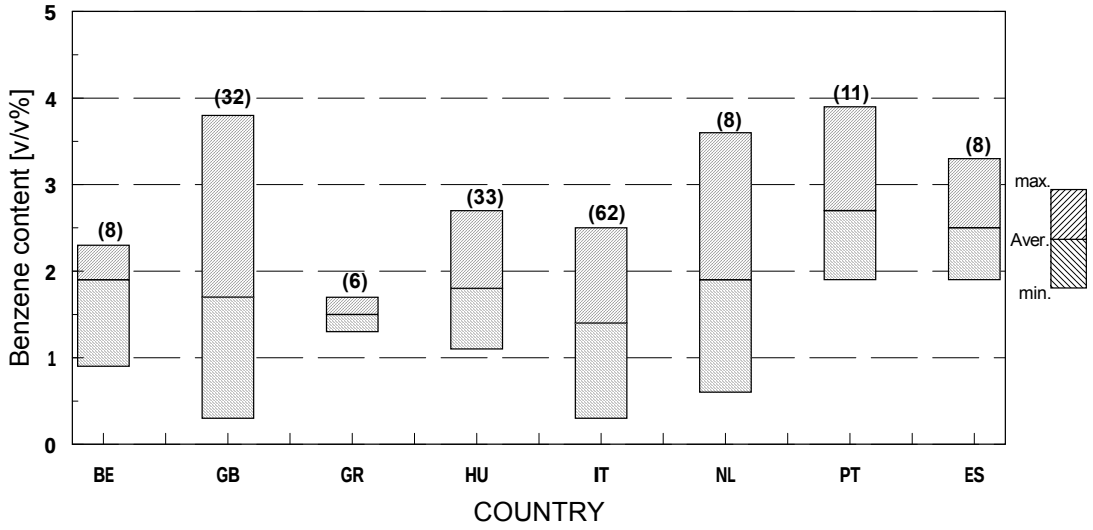
(x) = number of samples

Figure 27 Benzene content (% v/v) of regular unleaded



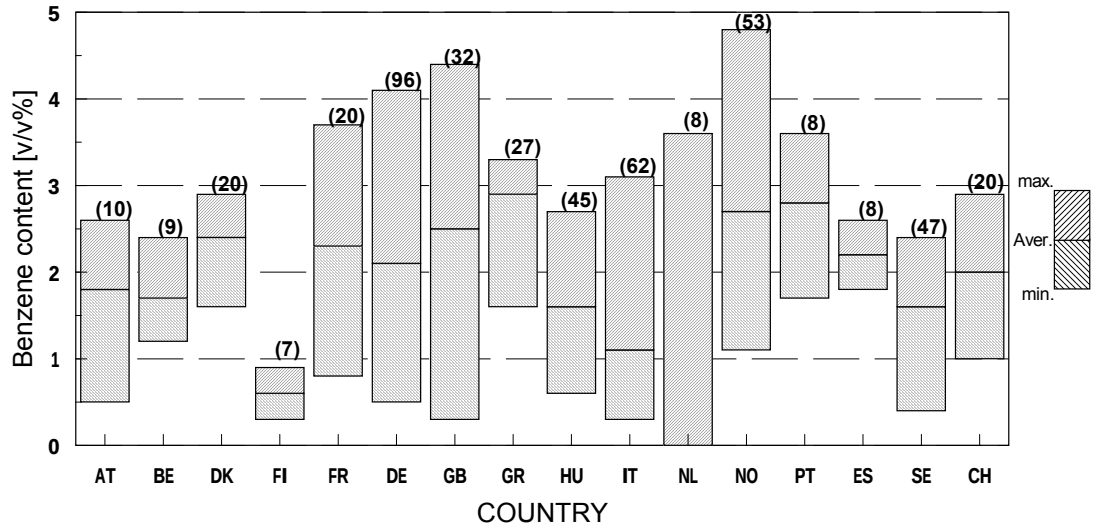
(x) = number of samples

Figure 28 Benzene content (% v/v) of super leaded



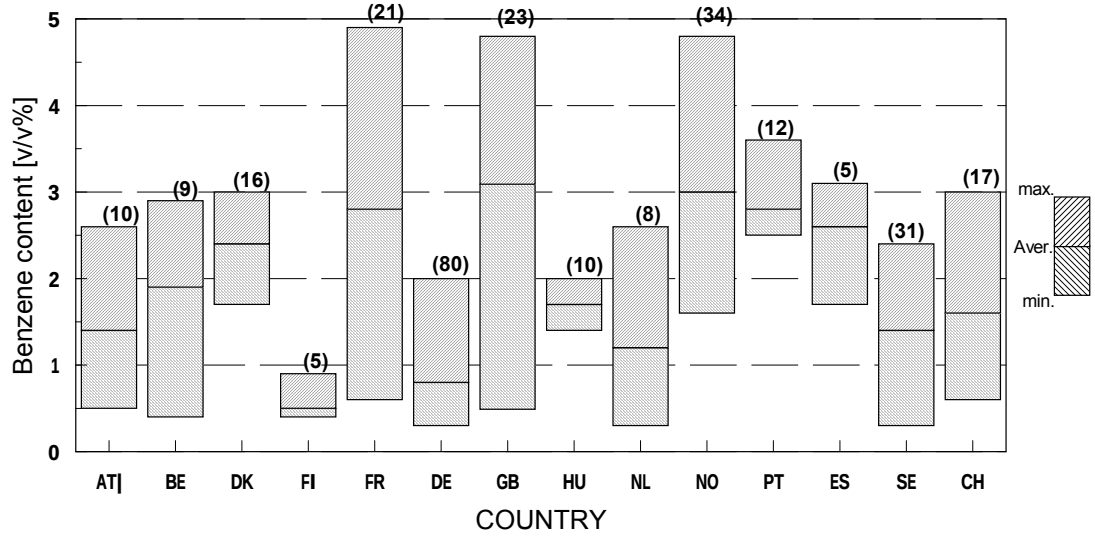
(x) = number of samples

Figure 29 Benzene content (% v/v) of super unleaded (95)



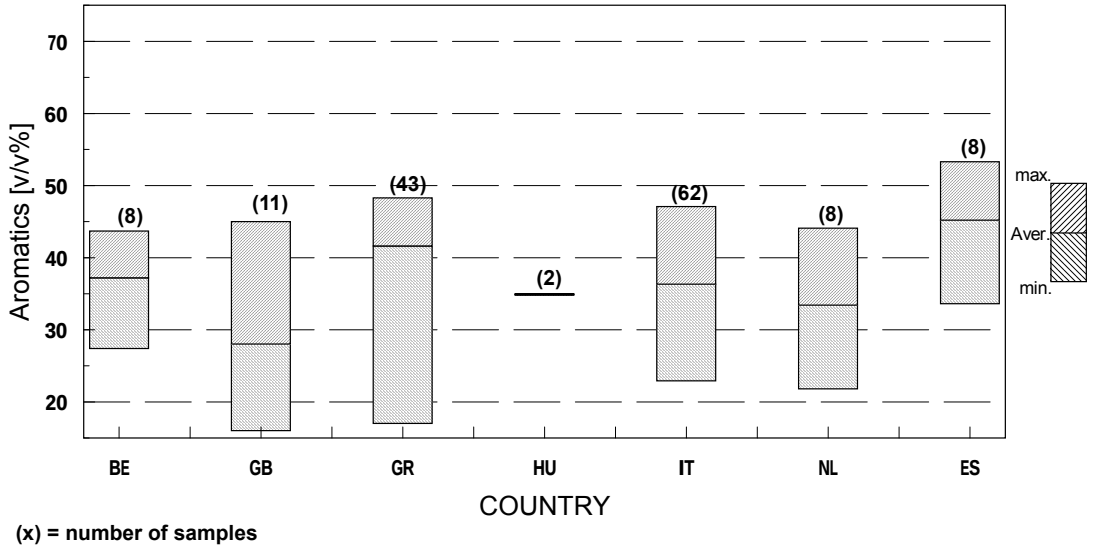
(x) = number of samples

Figure 30 Benzene content (% v/v) of super unleaded (98)



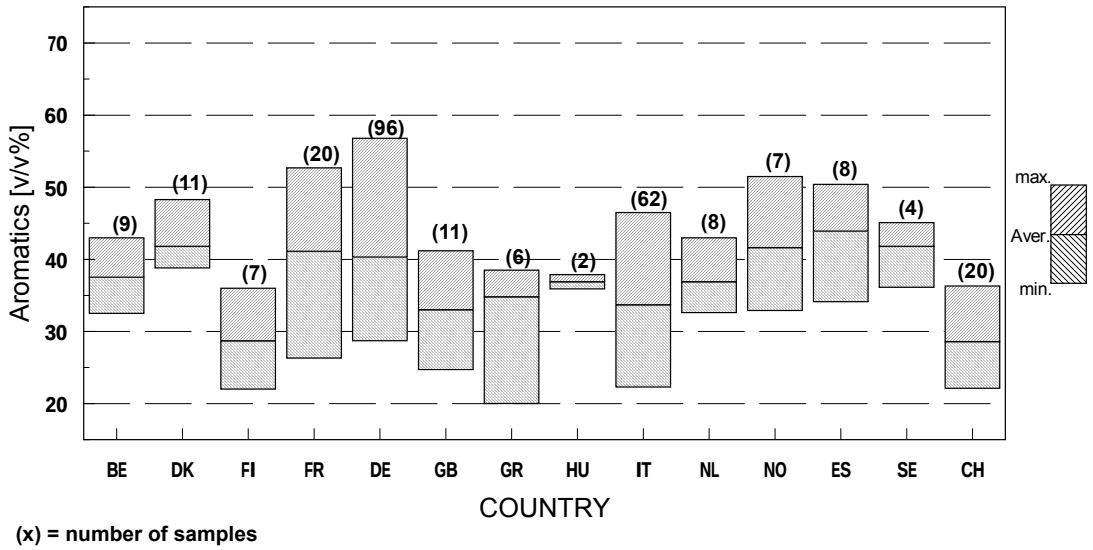
(x) = number of samples

Figure 31 Aromatics content (FIA) (% v/v) of super leaded



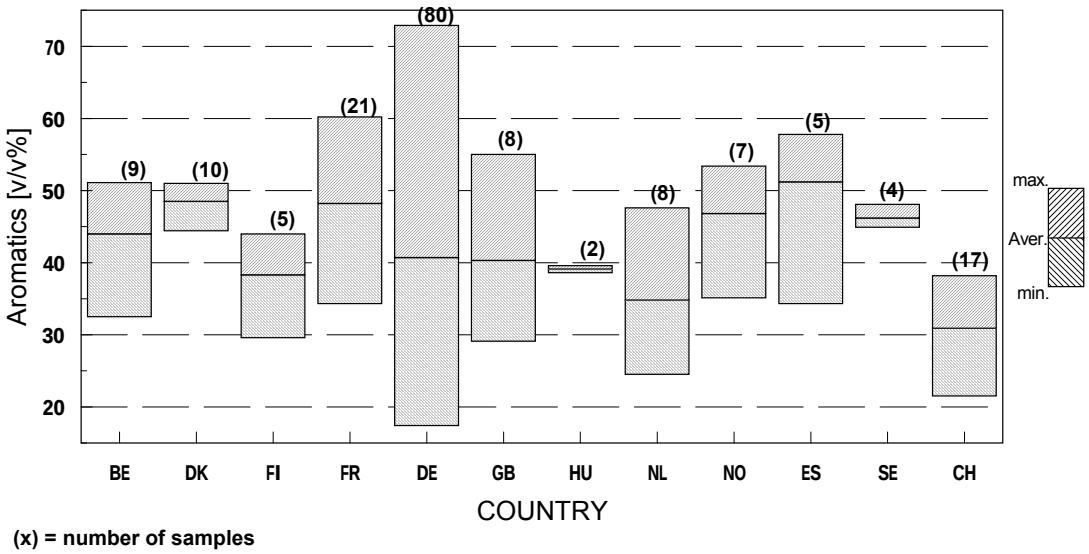
(x) = number of samples

Figure 32 Aromatics content (FIA) (% v/v) of super unleaded (95)



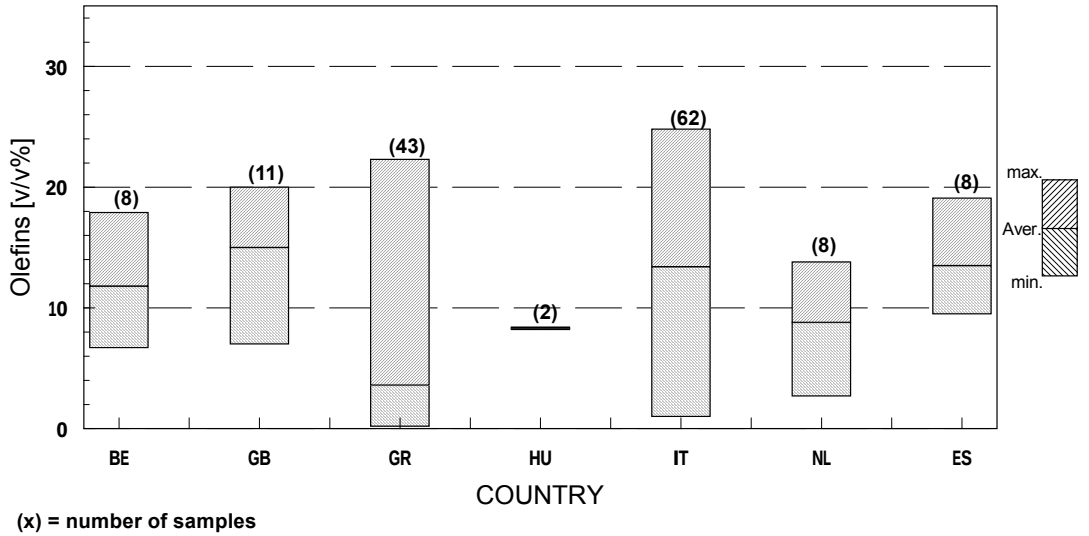
(x) = number of samples

Figure 33 Aromatics content (FIA) (% v/v) of super unleaded (98)



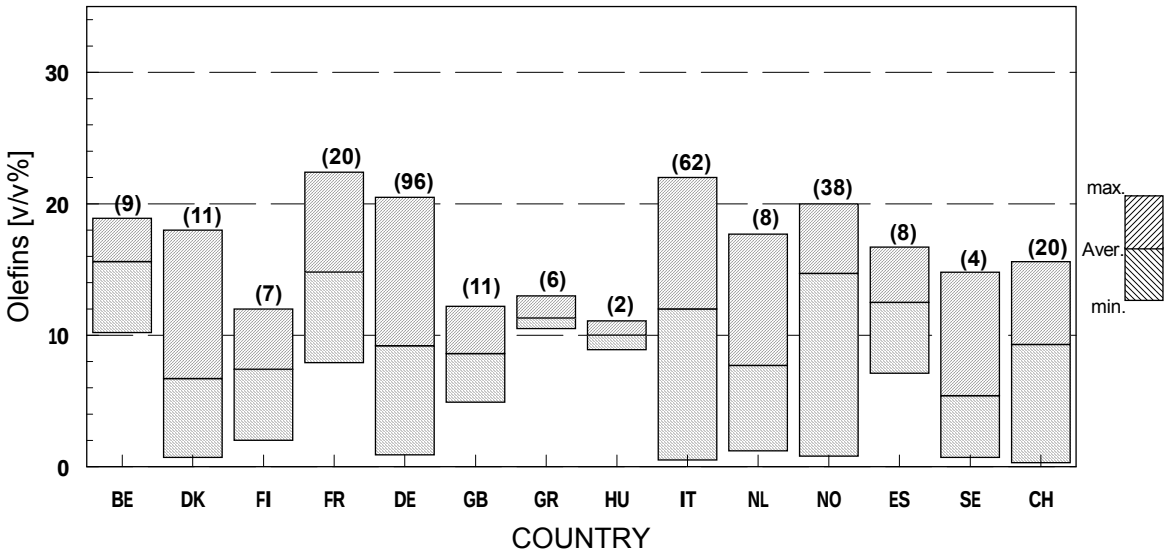
(x) = number of samples

Figure 34 Olefins content (FIA) (% v/v) of super leaded



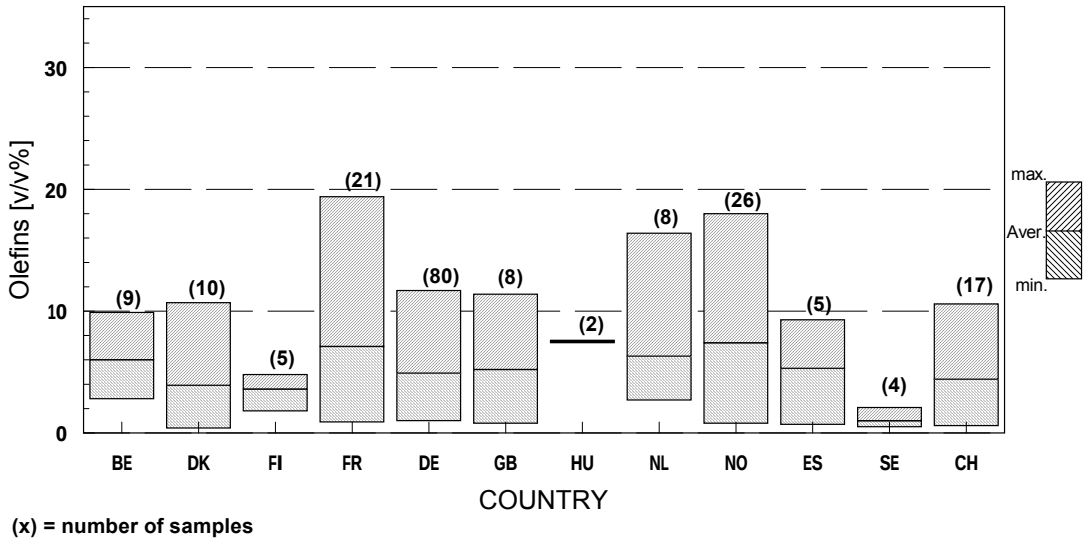
(x) = number of samples

Figure 35 Olefins content (FIA) (% v/v) of super unleaded (95)



(x) = number of samples

Figure 36 Olefins content (FIA) (% v/v) of super unleaded (98)



(x) = number of samples