

<b>Report of voting on ISO/DIS 15869-1</b>		<b>ISO/TC 197 N 295R Annex B</b>	
<b>Compilation of comments</b>		Date:2004-12-01	Reference document: ISO_DIS_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
DE			ge	Germany objects to forward this draft for ISO/FDIS without substantial amendment. We recommend a careful review of the existing text, in particular under the aspect of a car manufacturers' view, and a second ISO/DIS- ballot of the amended text.		
DE			ge	Too less information available at the moment to publish a standard for H2 storage tanks, e.g. on 700 bar. Further investigation is necessary. Taking over knowledge from CNG up to 350 bar without checking applicability seems to be an unprofessional way. Harmonization with ECE draft regulations not guaranteed, as these documents could be significantly changed in the future.	Postpone publication of the standard.	
FR			ge	We consider that this document shall cover not only tanks on vehicles but complete high pressure hydrogen system. With components as valves, pressure relief devices, connecting devices .. The EHP document is considering that this way (here above) should be followed.		
UK			GE	We find it unnecessarily confusing to have the requirements of this standard spread across 5 separate documents. It would be much better to have all the requirements for each type of tank in a separate standard rather than have to refer to a number of different documents. A similar pattern to that of the ISO 11119 documents would be much better.		
UK	Page v f)		TE	retesting should be in a separate retest standard and not part of a manufacturing standard.	Delete	
UK	Page v Last para.		TE	This is a regulatory matter and is not something the manufacturer can police.	Delete.	
**	General		ed	Units of time, when preceded by a number, shall be abbreviated.	Use X h, not X hours; use Y min, not Y minutes	

<b>Report of voting on ISO/DIS 15869-1</b>		Date:2004-12-01	<b>ISO/TC 197 N 295R Annex B</b>
<b>Compilation of comments</b>			Reference document: ISO_DIS_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
SE	General	-	ge	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 in a number of aspects and apparently without discussion in TC197 working group 6. A joint GRPE/ISO meeting to be held to discuss the variations.		
US	General		Ge	Recombine the 5 sections of ISO 15869 into 1. Having 5 sections creates confusion, contributes to potential for inconsistent technical requirements, and is wasteful of resources. ISO 11439 successfully combines all requirements into a single document, as do various similar national standards for natural gas and hydrogen fuel containers.	Combine ISO/DIS 15869-1, -2, -3, -4, and -5 into a single document.	
FR	Scope		ge	We request, as agreed on EIHDP draft, that removable cylinder assembly should be also considered in the document. This approach is indeed innovating and interesting in captives fleet	Scope ... as fuel for land vehicle with fixed or removable tanks.	
UK	Title		ED	Spelling mistake	Change "vehicule" to "vehicle"	
UK	Title		ED	Spelling mistake	Change "vehicule" to "vehicle"	
US	Front Page 15869-1	TITLE	ge	Word selection and alignment to other hydrogen documents. The definition of tanks according to Cambridge the base definition of tank is a container, usually made of metal, for carrying liquids or gases. Therefore tanks infer a metal cylinder and not a conformable shape container made from polymeric materials	Change tanks to containers	
US	TITLE		ed	Spelling error	Change vehicule to vehicle	
US	1	Para 1	ge	Add reference of tanks to containers.	Suggested wording – "This International Standard specifies minimum requirements for serially produced light weight refillable gas containers, here in referred to as tanks, intended for the ...."	
US	1	Para 2	te	Exclude the use of hydrides from scope	Suggested wording – " This International Standard is not intended as a specification for containers	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
**	1 Scope		ed	The Scope shall describe the contents of Part 1 only; general comments which apply to all parts belong in the Introduction. See ISO/IEC Directives Part 2, 2001, 6.2.1. The last paragraph is redundant as all this info is given in the Foreword.	used in onboard solid or liquid hydride hydrogen storage applications.” Rewrite Scope, move text to Introduction as necessary.	
SE	Cover page & heading on Page 1	Main heading	ed	Vehicle spelt incorrectly	Change “vehicule” to “vehicle”	
**	2		ed	Pls use correct fixed introductory text to norm refs. See Directives Part 2, 6.2.2.		
**	2		ed	ISO 7866 not mentioned in text; ISO 9809 not mentioned in text; ASTM D 3418 not mentioned in text:	Delete ISO 7866 from norm. refs.; Delete ISO 9809-1 and 9809-2 from norm. refs. Delete ASTM D 3418 from norm. refs.	
**	2		ed	ISO 6505-1 does not exist	Replace ISO 6505-1 with ISO 6506-1	
**	2		ed	A dated reference refers only to that dated version, revisions to norm refs. thus are not included, limiting the applicability to potentially outdated methods. See 6.6.7.5.3 in Directives Part 2.	Review norm refs, remove year of publication unless mentioned applying a specific clause, table, etc. in the text.	
UK	2		TE	Need to make reference to Stainless Steel Liners	add suitable reference.	
US	2		te	This document should not reference unpublished documents unless they are at least to the DIS stage.	Delete reference to ISO 11114-4 if it is not at least to the DIS stage and substitute acceptable alternative wording or requirements.	
UK	3.4		TE	Need to include materials cast.	Change to “...specified material of construction, material batch and process of manufacture.”	
UK	3.5		TE	Need to add material batch	Change to “...specified material of construction, material batch and process of manufacture.”	
US	3.6		te	Add a definition for Design Burst Pressure. Not defined in a table as in other parts of the standard and therefore requires its own definition in Part 1.	Suggested wording – “Design Burst Pressure – the over pressure level at which the tank is expected to safely reach before it leaks. This pressure is	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
				requires its own definition in Part 1.	defined by the manufacturer."	
UK	3.9		TE	This needs to be more specific.	Specify tolerances e.g. +/- 2%	
UK	3.10		TE	This definition is not necessary	Delete	
US	3.13		te	The temperature of a gas needs to be better defined. The measurement points and also the number needs to be specifically defined. Also, the time to measure needs to be defined. The settled gas temperature in some cases may take hours before it is homogeneous through the tank due to the thermal and radiative characteristics of the container design. Preliminary studies at GTI have shown that the temperature distribution of the gas inside of the tank	An action item for the working group needs to be developed to define a method on how to properly measure the tank temperature.	
UK	3.15		TE	As natural gas is allowed as part of a blend, reference needs to be made to the need to test for resistance to Hydrogen Sulphide stress cracking and Stress Corrosion Cracking in Hydrogen Sulphide Environments.	Add a suitable reference to NACE TM0177-96; Laboratory Testing of Metals for Resistance to Sulphide Stress Cracking and Stress Corrosion Cracking in H <sub>2</sub> S Environments.	
UK	3.16		TE	Remove the term "gas-tight" since non-metallic liners cannot fulfil this requirement.	Change to ".used as an inner shell..."	
UK	3.17		ED	Add plurals.	Change to " person(s) or organizations(s)"	
US	3.17		te	The definition for leakage is missing from this section.	Suggested wording – "Leakage is the release of gas through a crack, pore, unbond, or similar defect. Permeation through the wall in conformity to section C.18 is not considered to be leakage."	
UK	3.19		ED	Amend title	Change to "pre-stress"	
UK	3.20		TE	Change definition to one more appropriate	Change to "Design life specified by the manufacturer."	
UK	3.21		TE	This is not relevant	Delete	
UK	3.22		TE	This is not relevant	Delete	
UK	3.23		TE	This standard should be a purely performance based standard, therefore the concept of stress ratios is not	Remove references to stress ratios.	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	3.24		TE	appropriate.		
US	3.24		te	The definition for tank would be required since the word container has been substituted in the title	Add "This shall be 1.5 x working pressure"	
SE	General & 3.26	-	te	At the joint GRPE/ISO meetings in 2002 & 2003 the term nominal working pressure was agreed as a more accurate description than working pressure together with representatives from SAE. The use of "nominal" was intended to clarify that it does not represent the maximum in service pressure experienced by a component and to avoid misinterpretation used in other key standards. Pressure definitions must be standardised and acceptable.	Suggested wording – " A container of an unspecified shape and material that is used as a method of hydrogen storage (not necessarily a metallic cylinder)." Change "working pressure" to "nominal working pressure"	
UK	4.1 Last Sentence		TE	If these conditions are not covered, reference needs to be made to documents where they are.	Add further references.	
UK	4.2		TE	Simplify the definition.	Change to "The service life shall not exceed 20 years."	
US	4.2		Te	The standard and not the manufacturer should specify the safe service life	All tanks are to be manufactured to have a safe service life for 20 years.	
US	4.2		Te	Increase maximum service life from 20 to 25 years. Customers are asking for the increase and service history of fuel containers in automotive service indicates no problem in extending the life.	...The maximum service life shall be <u>20</u> <u>25</u> years.	
UK	4.3		TE	Simplify the definition.	Delete 1 <sup>st</sup> sentence.	
US	4.3		Te	The standard and not the manufacturer should specify the safe working pressure by defining how this value is obtained	The working pressure is defined by the maximum pressure that can be used to obtain the required burst ratio for the specific cylinder design	
US	4.3		ed	This is a definition for working pressure and needs to be moved to definitions section 3.	Move the definition to section 3	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	4.4		TE	Simplify the definition.	Change to "Tanks shall be designed to be filled up to a maximum pressure of 1,25 times the working pressure.	
US	4.4		ed	This is a definition for max filling pressure and should be moved to definitions section 3. Also referred to as maximum design pressure in other parts of standard.	Move the definition to section 3	
DE	4.5		te	4.5.1 assumes that 5.000 cycles were established when the tank is filled up once per day during 15 years. Considering a range of 120 km (which is very low) the following must be calculated: - filling up once per day: 15 year x 365 day/year x 120 km/day = 657.000 km This km-number is much higher than a vehicle life time! 4.5.2 specifies how to calculate the extended number of cycles, if these are higher than 5.000. F= L/R . Using a real life-time mileage of vehicle of 300.000 km F= 300.000/120= 2500 cycles. Conclusion: Considering a low vehicle range and a real life-time mileage, the number of 5.000 filling cycles is at least two times higher than the number obtained with real passenger vehicle value!	Change the minimum requirement of 5.000 filling cycles to a real passenger vehicles number without having to implement a UMCS as described in 4.5.3. Filling cycles calculated using 4.5.3 shall be specified.	
UK	4.5.1		TE	Change the wording.	Change to "Cylinders shall be designed to be filled for up to 1000 times per year of service".	
UK	4.5.1		TE	The note is confusing.	Delete	
SE	4.5.1	1 <sup>st</sup> para	ed	Clarification	Tanks shall be designed for 5000 filling cycles, except as permitted in 4.5.2 and 4.5.3.	
SE	4.5.1	Note	te	The note is incorrect, 5000 filling cycles was not established on the reasons given. The concept was established in the GRPE/ISO meetings and 5000 filling cycles was based on the assumption of typical lifetime mileage and vehicle range.	Remove or correct the note	
US	4.5.1		ed	Simpler wording.	Change to read:	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date: 2004-12-01  
Reference document: ISO/DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
US	4.5.1		Ed	Delete note. It is not entirely accurate, and doesn't address the current 20 year life or possible extension. It should be acceptable to simply state the life requirement.		
US	4.5.1		ed	Cycles used twice in the same sentence (redundant word)		
**	4.5.2		ed	Equation problems: F is the SI symbol for force; use n for number of cycles; provide units for L and R (SI does not use miles but rather kilometres...)		
UK	4.5.2 1 <sup>st</sup> para.		TE	It is unclear who the "vehicle manufacturer" is.		
UK	4.5.2 1 <sup>st</sup> para.		TE	This paragraph is confusing.		
US	4.5.3		te	There should be a minimum number of filling cycles for which the tank is designed.		
UK	4.6		TE	This is not relevant		
US	4.6		ed	Clearer wording.		
US	4.6		te	See comments regarding section 3.13		
UK	4.7		ED	Amend title.		
					Tanks shall be designed to be <del>be filled up to a number of filling cycles of</del> <u>exposed to 5000 filling cycles</u> , except as permitted in 4.5.2 and 4.5.3.  <del>Note: The number of 5000 filling cycles was established based on the assumption that the tank would be filled up once per day for a maximum service life of 15 years.</del>  Suggested wording – "Tanks shall be designed to have sustain 5000 filling cycles, except as permitted in 4.5.2 and 4.5.3.  Correct as necessary  Add definition.  Change last sentence to "The extended number of filling cycles shall be calculated as follows:"  Change to read: ... the number of filling cycles for tanks may be less than 5000 cycles, <u>but may not be less than 1000 cycles.</u>  Delete  Change to read: Tanks shall be designed to be suitable for <del>use in an average</del> gas temperature <del>between</del> <u>from</u> -40 °C <del>and to 85 °C</del> <u>in</u> <del>during</del> normal <del>conditions</del> <u>operation</u> including filling and discharging.  Same as above in section 3.13  Change to "Tank Design Temperature"	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01	<b>ISO/TC 197 N 295R Annex B</b>
	Reference document: ISO_DIS_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	4.7		TE	The temperature of 85°C seems high.	Change to 65°C in line with Transport Regulations.	
FR	4.7		te	In case of plastic liners we should take into account the full range of temperature which can be reached during filling.	For plastic liners, value of temperature (-40 +85) shall apply to difference between extrema ,not to the average.	
JP	4.7	Paragraph	ed	(original sentence)"Tanks shall be designed to be suitable for the following material temperature limits : -40°C to 85°C." Simply express the definition of temperature as use conditions.	"Tanks shall be used at the following ambient temperature : -40°C to 85 °C."	
US	4.7		ed	Clearer wording.	Change to read: Tanks shall be designed to be suitable for <del>following</del> material temperature <del>limits:of from</del> -40 °C to 85 °C.	
US	4.7		te	Need to take into consideration that hot spots in the tank liner can rapidly form due to the heating properties of the gas flow.	Suggested wording – "The tank manufacturers must ensure that their designs take into account the creation of hot spots and temperature sensors must be properly located to identify an over temperature situation.	
JP	4.8	1 <sup>st</sup> para	ge&te	Differences between "pure H2" and "H2 blend containing more than 2% H2" are very big both in physical and chemical properties as well as in their required safety considerations. The tank tests using the service gases should be conducted by using the gases in the same range of gas compositions as the service gas. The tank should be specified and marked for the gas composition range that was confirmed the safety by the tests. ( A marking example: "CH4-H2 blends" )	<input type="checkbox"/> Tanks shall be designed to be filled with compressed gaseous hydrogen or hydrogen blends containing more than 2% hydrogen by volume and the rest compressed dry natural gas. <input type="checkbox"/> <i>Add after the 1<sup>st</sup> sentence:</i> " Tanks shall be confirmed the safety in service by the tests by using the gas with the same composition range as the service gas." for example : hydrogen blends ( CH4 : 97.9% - 70.0%, H2 : 2.1% - 30.0% )	
US	4.8		ed	Correct typographical error.	Change "that" to "than" in the second line.	
US	4.8		te	There is no need to require that tanks intended for use in hydrogen blend service be also be suitable for use in pure hydrogen blend service	Change the second sentence to read: <a href="#">Tanks intended for pure hydrogen service shall be</a>	



**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01 **ISO/TC 197 N 295R Annex B**  
Reference document: ISO\_DIS\_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
				hydrogen service.		
US	4.8	1	Te	Define that hydrogen blends would be mixed with natural gas or methane, so that other blends would not be allowed. Also, change "that" to "than".	<del>shall comply that complies</del> with, or be of greater purity than, Type 1, Grade A gas composition in ISO 14687:1999/Cor 1:2001.	
US	5.1.2.1		te	The tank design has no definitive life.	Tanks shall be designed to be filled with compressed gaseous hydrogen and hydrogen blends containing more than 2% hydrogen by volume and the balance natural gas or methane.  Change to read: The tank manufacturer shall keep on file the information specified herein. This information shall be retained for the intended life of the tanks manufactured in accordance with the specific design.	
UK	5.1.2.2 1 <sup>st</sup> sentence		TE	Clarify.	Change to "...provided to the vehicle manufacturer by the tank manufacturer."	
UK	5.1.2.2 f)		TE	Inspection requirements should not be in a manufacturing standard.	Delete.	
UK	5.1.2.2 l)		TE	Add further details.	Change to "...not provided as agreed with the vehicle manufacturer."	
UK	5.1.2.2. j)		TE	This is rather vague. The requirements need to be more specific on what should be included in the description	Add more detail.	
SE	5.1.2.2		ge	Manufacturer and container identification information to be included	Add: Manufacturer Name: Manufacturer Address Container Identification: Nominal Working Pressure: MPa Type: Diameter: mm Length: mm	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
SE	5.1.2.2	g & h	ge	Maintain consistency and use fire protection system		
UK	5.1.2.3		TE	Change the title to allow methods other than drawings to be used to record information.		
UK	5.1.2.3		TE	Drawings are not the only method to show and record information.		
UK	5.1.2.3 c)		ED	Remove "all"		
SE	5.1.2.6		ge	The test data that substantiates the effectiveness of the FPS should be stated		
FR	5.1.2.6 & C. 3.5		te	It should be authorised to use only one PRD per tank system ( cylinder assembly )provided there is no isolation valves between cylinders.		
US	5.1.2.7		te	It is stated that "Details of all fabrication processes, non-destructive examinations, batch test and test on every tank shall be specified by the tank manufacturer". This will create substantial inconsistencies between manufacturers of similar tanks.		
UK	5.1.2.7 2 <sup>nd</sup> para.		TE	The winding pattern is an important feature which needs to be noted.		
UK	5.1.2.8		TE/ GE	More information is required on this whole concept. Other committees have worked on this without success.		
UK	5.1.2.8		TE	If clause is to remain, the paragraph should be amended.		
				Internal Volume: litres Empty Weight: kg Container Threads: Replace g) and h) with "a specification for the fire protection system including thermally activated pressure relief devices and insulation if used" Change to "Design Information" Change to " All tank drawings and related technical information shall be kept on file by the tank manufacturer and show..." Amend Change final sentence to "The test data from C.3...." The arrangement of the thermally activated pressure....that will protect the tank or tank system.... The specific requirements for all non-destructive examinations, batch test and test on every tank must be specified by the standard. Change to "...resin mix ratio, filament tension, winding pattern and speed..." Delete. Change to "...maximum defect size which will ensure leak before break (LBB) fracture performance. The defect size as specified shall be capable of detection by suitable NDE methods."		

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	5.1.2.8 Note		TE	The method specified in Annex B is not realistic, also, is it practical and realisable?	Remove.	
US	Introduction 5.1.2.8 Annex B	b)	ed	The word "defect" is problematic when it is used to describe anomalies in materials. If we talk about defects with certain dimensions being acceptable, that puts us in the position of permitting tanks to be manufactured with defects...a not very popular position to be in when trying to describe how this is all OK to the public. The word "discontinuity" is preferred. When a discontinuity exceeds the permitted size, then it becomes a defect.	Consider using "discontinuity" in place of "defect" where the term is used in this standard.	
US	5.1.2.8		te	It is stated that "the tank manufacturer shall specify the maximum defect size for non-destructive examination. This will create substantial inconsistencies between manufacturers of similar tanks.	The specific requirements for the maximum defect size for non-destructive examination must be specified in the standard.	
UK	5.1.2.9		TE	This is not necessary.	Delete	
UK	5.1.2.10		TE	This is not necessary.	Delete	
US	5.2.1	2 <sup>nd</sup> para.	te	The tank design has no definitive life.	Change to read: The tank manufacturer shall retain the batch test results for the intended life of the tanks <u>in the batch design</u> .	
US	5.3	a)	te	The further test should be the same as the test being carried out.	Change to read: If there is evidence of a fault in carrying out a test, or an error of measurement, a further test <u>of the same kind</u> shall be performed. If the result of this test is satisfactory, the first test shall be ignored;	
US	5.3	b)2)	te	Approved by whom?	Either specify the person(s) who must approve the method, or change to read: If the failure is due to a cause other than the heat treatment applied, all defective metal tanks or liners shall be either rejected or repaired <u>by an approved method</u> .	

<b>Report of voting on ISO/DIS 15869-1</b>		<b>ISO/TC 197 N 295R Annex B</b>
<b>Compilation of comments</b>		Reference document: ISO_DIS_15869-1
Date:2004-12-01		

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	5.1.3.2		ED	Amend title	Change to "Design Changes"	
UK	5.1.3.2 1 <sup>st</sup> para.		TE	Minor changes are discussed but not major. Also, it should be clarified exactly what constitutes a major and minor change and what the affect of changing more than one parameter is, e.g. Length and diameter.	Add a new sentence "Major design changes must be qualified by a full test program."	
UK	5.2.1 1 <sup>st</sup> para.		TE	Need to allow for tests on liners.	Change to "...on finished tanks or liners that are.."	
UK	5.2.2		ED	Poor English.	Change to "...subjected to the tests as specified..."	
UK	5.3 b) 1) 2 <sup>nd</sup> para.		TE	This is unnecessary.	Delete	
UK	5.3 b) 1) 3 <sup>rd</sup> para.		TE	The term "even partially" is not required.	Change to "...tests prove unsatisfactory, all..."	
UK	5.3 b) 2) 2 <sup>nd</sup> sentence		TE	It is better to treat any rectified cylinders as a new batch for traceability purposes.	Change to "...they shall be treated as a separate new batch."	
UK	6 1 <sup>st</sup> para.		TE	The size of marking should be brought in line with other standards.	Change to "...permanent markings. Markings shall be a minimum of 5mm high on cylinders ≥ 140mm diameter and greater than 2.5mm high on cylinders < 140mm diameter. Marking..."	
JP	6	a)	ge&te	Tank should be distinguished by the marking "H2 ONLY" or "CH4 - H2 BLENDS ONLY", to avoid the confusion of service gas composition ranges. The main component gases should be marked.	a) marking <<H2 ONLY>> or <<CH4 - H2 BLENDS ONLY >>;	
JP	6	example 1 <sup>st</sup> line	ge&te	"H2 ONLY" or "CH4 - H2 BLENDS ONLY" should be distinguished. The main component gases should be marked. Distinction of "H2 gas" or "CH4 - H2 blends gas" is indispensable.	<<H2 ONLY>> or <<CH4 - H2 BLENDS ONLY >>;	

<b>Report of voting on ISO/DIS 15869-1</b>		<b>ISO/TC 197 N 295R Annex B</b>
<b>Compilation of comments</b>		Reference document: ISO_DIS_15869-1
Date: 2004-12-01		

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
JP	6	example 2 <sup>nd</sup> line	ed	The expiry date 2013-03 of the given example marking is not very suitable as a guide explanation: normally, it is to be 15 years after the manufacture date, that is to be 2018-03.		
SE	6	1 <sup>st</sup> para	ed	Maintain consistency and clarity of tank types	Change "ISO15869-2 and ISO15869-3" to "ISO15869-2 (Type 1) and ISO15869-3 (Type 2)"	
SE	6	j	te	Alternatives should be permitted	Change to "When labels are used, a unique identification number and the manufacturer's identification should be duplicated in an alternative way in the event that the label is destroyed"	
US	6	c)	te	The number of filling cycles should be marked on the tank no matter if the number of cycles exceeds 5000, is equal to 5000, or is less than 5000.	Delete: if the tank was designed to a reduced number of filling cycles as per 4.5.3;	
US	6	l)	ed	Capacity is capacity. It is not a function of the fluid.	Change to read: <del>Water</del> Capacity <u>at ambient temperature</u> (l)	
UK	6		TE	An "acceptable example" is not very specific. A standard should say what is required.	Revisit.	
UK	6		ED	The markings on the label should be arranged in same order as list a) to l) or vice versa.	Revisit.	
UK	6 b) Note		TE	The note is incorrect, service life begins at the date of manufacture.	Delete.	
UK	6 b)		ED	To be correct the word "or" needs to be added between b) and c).	Add.	
UK	6 c) d)		ED	These should be combined into one clause as they are required together.	Change to "The words <DO NOT USE AFTER XXXX filling cycles> where XXXX identifies the maximum number of filling cycles and the words <DO NOT USE WITHOUT A USAGE MONITORING AND CONTROL SYSTEM> if the tank was designed to a reduced number of filling cycles as per 4.5.3;"	

**Report of voting on ISO/DIS 15869-1**  
**Compilation of comments**

Date:2004-12-01  
**ISO/TC 197 N 295R Annex B**  
Reference document: ISO\_DIS\_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
**	6 i) and example		ed	What does PRD mean in "manufacturer-approved PRD"	Amend subsequent clause letters. Provide meaning pls.	
UK	6 l)		TE	Amend wording.	Change to "<USE APPROVED PRD XXXX ONLY>"	
UK	6 j)		ED	Unnecessary extra wording.	Change to "...stamped on an exposed metal surface."	
UK	7 1 <sup>st</sup> para.		ED	Amend text.	Change to "...from the manufacturer, every tank.."	
UK	7 2 <sup>nd</sup> para.		TE	Amend text	Change to "The manufacturer's statement of service and instructions to ensure the proper handling and use of the tank shall be supplied to the vehicle manufacturer."	
UK	Annex's		GE	The annex's should be arrange such that the normative ones come first.	Amend.	
UK	Annex A		TE	This standard should be a purely performance based standard, therefore the concept of stress ratios is not appropriate.	Delete.	
UK	Annex B		TE	The term NDE is not defined.	Add Definition for NDE.	
UK	Annex B		TE	More information is required on this whole concept. Other committees have worked on this without success.	Delete.	
US	Annex B	Item (a)		External as well as internal flaws are required for the testing	Add "Introduce external and internal flaws".	
SE	Annex C		te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 by not including a Glass Transition Temperature Test	A test to be added based on the following: Sampling The test applies to Type 2, 3 and 4 Containers. The test applies to composite resin	

**Report of voting on ISO/DIS 15869-1**  
**Compilation of comments**

Date:2004-12-01  
**ISO/TC 197 N 295R Annex B**  
 Reference document: ISO\_DIS\_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
					<p>materials only.</p> <p>Prototype testing - Number of samples to be tested: 3</p> <p>Procedure</p> <p>The glass transition temperature of resin materials shall be determined in accordance with ASTM D3418.</p> <p>Requirements</p> <p>The test results shall be within the Manufacturer's specifications.</p> <p>Results</p> <p>The glass transition temperature to be presented shall be the minimum measured value.</p>	
UK	C.1		TE	Method of conducting the test is not clear.	Change to "One tank shall be hydrostatically pressurized to 1,25 times working pressure. It shall then be heated to 85°C and held at this pressure and ...."	
JP	C.1	2 <sup>nd</sup> line	te	Whether 1000 hours is necessary or not in the accelerated stress rupture test depends upon materials used for the test. Since it takes extremely many hours to evaluate, the definition should exempt the proven materials from the test and allow the evaluating time to be reduced.	Add a sentence "the test is not required if the reinforcing material is carbon fibre as a proven material."	
UK	C.2 b)		TE	The test should be standardized with other established standards.	Change to "...not more than 3 MPa and not less than 1,25 times the working pressure at a rate not to exceed 10 cycles per minute. The temperature of the outside surface of the cylinder shall not exceed 50°C during the test."	
DE	C.3		te	What is the rationale behind the 1,65 m fire size? See ECE R 34 for reference: <i>flame to which the tank is exposed must be obtained by burning commercial fuel for positive-ignition engines</i>	Apply a fire size according to the size of the tank.	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
				<i>(hereafter called "fuel") in a pan. The quantity of fuel poured into the pan shall be sufficient to permit the flame, under free-burning conditions, to burn for the whole test procedure. The pan dimensions must be chosen so as to ensure that the sides of the fuel tank are exposed to the flame. The pan must therefore exceed the horizontal projection of the tank by at least 20 cm, but not more than 50 cm. The sidewalls of the pan must not project more than 8 cm above the level of the fuel at the start of the test. The pan filled with fuel must be placed under the tank in such a way that the distance between the level of the fuel in the pan and the tank bottom corresponds to the design height of the tank above the road surface at the unladen mass...</i>		
UK	C.3.3		TE	The description of the test fire is rather vague. Standards exist which give details on suitable test fires and these should be referenced.	Add reference to standards for test fires e.g. ISO 11439, CGA C14 1992 or EN3-1:1996	
SE	C.3.4	3 <sup>rd</sup> para	te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 by requiring recording at 30s intervals rather than 10s	Change recording interval to 10s	
NO	C.3.4		te	The described temperature monitoring needs to be corrected to avoid different requirements for different container types. Since a minimum temperature of 590 °C is required in par. C.3.5, the temperature measurements should be taken directly below the container rather than on the container wall. If the measurements are taken on the container wall the material properties of the wall itself will influence on the measured data. This means that the given minimum temperature requirement will be harder to fulfil for some materials than for others. The requirement is intended to make sure that the fire produces sufficient energy, not to specify the heat transfer properties of the	Change the first paragraph of C.3.4 to: "Temperatures shall be monitored by at least three thermocouples located directly below the bottom of the tank and spaced not more than 0,75 m apart."	



**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date: 2004-12-01  
Reference document: ISO/DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
				outer container wall. By deleting the word "surface" and adding the words "directly below", the above-mentioned influence of the wall material will no longer be present, hence leading to a requirement which is independent of the container type. The proposed way of monitoring temperatures is practiced by the ECE Regulation 67 (LPG containers) and the U.S. Code of Federal Regulations §571.304 (CNG containers).		
SE	C.3.4		te	The described temperature monitoring needs to be corrected to avoid different requirements for different container types. Since a minimum temperature of 590 °C is required in para. C.3.5, the temperature measurements should be taken directly below the container rather than on the container wall. If the measurements are taken on the container wall the material properties of the wall itself will influence on the measured data. This means that the given minimum temperature requirement will be harder to fulfil for some materials than for others. The requirement is intended to make sure that the fire produces sufficient energy, not to specify the heat transfer properties of the outer container wall. By deleting the word "surface" and adding the words "directly below", the above-mentioned influence of the wall material will no longer be present, hence leading to a requirement which is independent of the container type. The proposed way of monitoring temperatures is practiced by the ECE Regulation 67 (LPG containers) and the U.S. Code of Federal Regulations §571.304 (CNG containers).	Change the first paragraph of C.3.4 to: "Temperatures shall be monitored by at least three thermocouples located directly below the bottom of the tank and spaced not more than 0,75 m apart."	
US	C.3.4		te	In order to prevent a tester from clustering the thermocouples in one spot, there should be a minimum spacing as well.	Change to read: ...spaced not more than 0.75 m apart, <u>nor less than 05 m apart.</u>	
UK	C.3.4 3 <sup>rd</sup> para.		TE	Amend wording.	Change to "...be recorded at appropriate internals during the test."	

**Report of voting on ISO/DIS 15869-1**  
**Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	C.3.5 1 <sup>st</sup> para.		TE	Amend wording.	Change to "...and tested in the horizontal position."	
UK	C.3.5 2 <sup>nd</sup> para.		TE	Remove the word "Immediately" as this is unnecessary.	Amend.	
JP	C.3.5	Paragraph	te	Test results differ upon the position of PRD in case of tanks of length greater than 1,65m and then appropriate evaluation wouldn't be expected.	Add the sentence "PRDs shall be fitted at the position where their performance may be evaluated(inside of fire source). Practical fitting positions shall be determined in consideration of safety between tank manufacturers and car ones. "	
US	C.3.5	3 <sup>rd</sup> para.	te	In order to prevent a tester from concentrating the heat at one point, there should be a requirement that all three thermocouples reach the minimum temperature.	Change to read: Within 5 minutes of ignition, the temperature of at least one thermocouple shall indicate at a minimum temperature of 590 °C. <u>Within 10 minutes of ignition, the temperature of all thermocouples shall indicate at a minimum temperature of 590 °C.</u> <del>This</del> <u>These</u> minimum temperatures shall be maintained for the remaining duration of the test.	
UK	C3.5 3 <sup>rd</sup> para.		TE	Further details are required.	Change to "...minimum temperature of 590°C, measured 25mm below the cylinder."	
UK	C.5		TE	This should not be limited to a hardness test, it should be a test on the homogeneity of the batch. If the test is meant to be a purely a hardness check, other test methods should be allowed.	Review in line with other standards.	
SE	C.5	1 <sup>st</sup> sentence	te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 by requiring different test locations.	Change to "Hardness tests shall be carried out on the parallel wall at the centre and at one of the domed ends of each tank or liner in accordance with ISO 6506-1:1999."	
SE	C.6.2 & C. 7 a)		ed	Same wording would be simpler	Make wording consistent	
SE	C.7	a)	te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in	Should the reference read ISO4624:2002 ?.	

<b>Report of voting on ISO/DIS 15869-1</b>		<b>ISO/TC 197 N 295R Annex B</b>	
<b>Compilation of comments</b>		Date:2004-12-01	Reference document: ISO_DIS_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
				2002 & 2003 by requiring testing in accordance with ISO4624:1978 instead of ASTM D3359.		
SE	C.7	e)	te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 by not stating that the maximum gloss loss allowed is 20%.	Add "The maximum gloss loss allowed is 20%."	
SE	C.7	f)	te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 by requiring an undercutting of 2mm rather than 3mm	Change "2mm" to "3mm"	
SE	C.7	e) & f)	ge	An indication of the purpose of the test should be added as in the previous sections	Add "Light and water exposure" and "Salt spray exposure" to e) and f) as appropriate.	
UK	C.8 2 <sup>nd</sup> para.		TE	Bring in line with other standards.	Change to 3MPa.	
UK	C.9		GE	The test should be brought in line with those seen in other standards.	Revise in line with 8.5.8.2 of ISO 11119-2	
DE	C.9		te	Drop test requirements seem to compensate manufacturers' process (transport and assembly) quality. As all quality issues are in the responsibility of the manufacturers, drop test shall be deleted from the standard. (No dropped container should be implemented into a vehicle, with or without any drop test performed).	Delete complete drop test paragraph.	
UK	C.9 c)		TE	Reference is made to non-symmetrical and non-cylindrical tanks. Is this correct?	Remove.	
UK	C.10		GE	This test is similar in principle to that in Annex F of ISO 11439 and as such should be brought in line with this accepted method.	Revise in line with Annex F ISO 11439	
UK	C.10		GE	It would be useful to have a diagram or illustration to show the test set up.	Include diagram.	
UK	C.10 b)		ED	"centre of percussion" is a strange term.	Replace "percussion" with "impact"	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date: 2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	C.10 d)		TE	Bring in line with other standards.	Change to 3MPa.	
UK	C.10 d)		GE	This test is difficult to perform practically.	Review test method. (see ISO 11439)	
UK	C.10 d) 2 <sup>nd</sup> sentence		TE	Where is the factor of 2,75 MPa/s derived from? This does not appear elsewhere. Also, there is no reference to any temperatures.	Review.	
UK	C.10 Last para		TE	Bring in line with other standards.	Change to 3MPa.	
DE	C.10		te	Chemical exposure test: What is the rationale behind sodium hydroxide and ammonium nitrate exposure?	Delete sodium hydroxide and ammonium nitrate from the solutions list.	
SE	C.10	b)	ge	i) If the use of units is to be consistent, the unit used for energy should be J, alternatively Pa used elsewhere in the text should be changed to N/m <sup>2</sup> . ii) "...and as close to that value as possible" is vague and open to too much interpretation	i) Change "30 Nm" to "30 J" ii) Delete "...and as close to that value as possible"	
SE	C.10	d)	ge	Maintain consistency of wording	Change "...not more than 2MPa and 1.25 times working pressure" to "...not more than 2MPa and to not less than 1.25 times nominal working pressure"	
US	C.10	c)	te	All of the solutions should be required to be applied to the tank.	Change to read: <del>Each of the 5 preconditioned areas shall be exposed to one of five solutions.</del> Each of the five preconditioned areas shall be exposed to one of five solutions (each solution shall be used and each solution shall be applied to only one preconditioned area).	
US	C.10 ( c )	3 <sup>rd</sup> par.	TE	Gasoline should be changed to ASTM D471 – Reference Fuel C since this would provide consistency in test results. The formulation of gasoline is different in different countries	Reference ASTM D471 - Reference Fuel C	
US	C.11	Last	Te	The test requires no evidence of rupture, leakage or fiber unravelling during the cycle test. In the final paragraph,	...For ISO 15869-5 (type 4) designs, prior to the hydrostatic burst test the tank shall be leak tested in	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
				only the Type 4 tanks are to be leak tested. Testing has shown that Type 2 and Type 3 tanks are more likely to leak as a result of this cycle testing than Type 4 tanks. Therefore, either all of the tank types should be subjected to a leak test or none of them should.	<del>accordance with C.16.</del> OR, ... For ISO 15869-5 (type 4) all designs, prior to the hydrostatic burst test the tank shall be leak tested in accordance with C.16.	
UK	C.11 a)		TE	There is no need for temperatures higher than 85°C.	Change to "...pressure, 85°C and 95%..."	
UK	C.11 b)		TE	Bring in line with other standards.	Change to "...more than 3MPa and not less than 1,25 times working pressure at 85°C..."	
UK	C.11 d)		TE	Bring in line with other standards.	Change to 3MPa.	
UK	C.11 d) Last sentence		TE	This is impractical to carry out.	Delete.	
UK	C.13		TE	It needs to be highlighted that this is for type 4 tanks only.	Revisit.	
DE	C.13		te	Why is Hydrogen Gas Cycling Test required for Type IV Tanks only?		
JP	C.13	2 <sup>nd</sup> para.	te	If the cylinder is to be used for both pure hydrogen and hydrogen blends, then the gas tests should be conducted for both hydrogen and hydrogen blends. Aware the big differences between pure hydrogen and hydrogen blends.		
SE	C.13	2 <sup>nd</sup> para	ge	Maintain consistency of wording	Change "...less than 2MPa to working pressure" to "...not more than 2MPa to not less than nominal working pressure"	
SE	C.13	3 <sup>rd</sup> para	te	What are the requirements?	State the requirements	
US	C.13	Paragraph 2	te	The location where the maximum temperature is measured is not defined and it varies depending on the design of the tank.	Working group needs to develop a work item to determine a method on defining the appropriate point where the temperature measurement can be made..	
US	C.13	Paragraph 2	te	The maximum venting time is not defined	Working group needs to develop a work item to determine a method on defining the appropriate maximum time that a tank can vent (based on	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
US	C.13	Paragraph 3	te	During this test it is not defined that the tank has to return to ambient conditions prior the beginning of the next cycle.	volume and other external factors).	
FR	C.13 § D C.11		te	It should be defined a filling rate rather than a filling time for considering various working pressure. It should be cycled up to 1.25 working pressure which is allowed during the filling. To measure an effect of H2 permeation through the walls and to show cracks due to depressurisation of tanks, we do recommend the following procedure : every 100 cycles, wait time enough for the gas to permeate through the walls, and depressurise .... care shall be taken to ensure that temperature during pressurisation and venting do not exceed the service conditions) ; leak test every 100 cycles	Hydrogen gas cycling test ....one finished tank....to 1.25 time working pressure & D: This commentary is not specific of type 4. It should apply to other type.	
UK	C.14 1 <sup>st</sup> para.		ED	The word "Schematically" is not required.	Remove.	
UK	C.14 2 <sup>nd</sup> para.		ED	Change "Actual burst pressure" to "The burst pressure"	Amend.	
UK	C.14 2 <sup>nd</sup> para		TE	This standard should be a purely performance based standard, therefore the concept of stress ratios is not appropriate.	Replace "Stress ratio with "burst ratio"	
SE	C.14	1 <sup>st</sup> para	ge	The use of "schematically" is out of context	Delete "schematically" or replace with "in series"	
SE	C.14	2 <sup>nd</sup> para	te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 by adding additional requirements.	Delete "Leak or rupture may occur in either the cylindrical region or the dome region of the tank. For ISO 15869-3 designs, the liner may not break into more than 3 pieces."	
UK	C.15		TE	This test is not appropriate.	Delete	
US	C.16		te	Leak test time duration is not defined	Suggest adopting the leak rate criteria as ANSI NGV 2. Bubble tight for 2 minutes.	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01	<b>ISO/TC 197 N 295R Annex B</b>
	Reference document: ISO_DIS_15869-1

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
UK	C.16 b)		TE	Poor English.	Change to "pressurize the tank to working pressure with dry air or nitrogen containing a detectable gas such as helium."	
UK	C.17		TE	Why the tolerance of +/- 1 Mpa?	Clarify.	
JP	C.17	1 <sup>st</sup> line	te	If the cylinder is to be used for both pure hydrogen and hydrogen blends, then the gas tests should be conducted for both hydrogen and hydrogen blends. Aware the big differences between pure hydrogen and hydrogen blends.		
SE	C.17		ed	–	In the heading change "tests" to "test"	
US	C.17		te	Angle of 45 degrees to what?	Specify angle to be 45 degrees to the tank centreline, or 45 degrees to a line tangent to the point of entry.	
US	C.17		te	The distance to target is not defined	Working group needs to develop a work item to determine a more definitive method on defining the range from which the gun can be shot relative to the center of the tank.	
UK	C.18 Lat sentence		TE	The figure of 1 millilitre seems too high. Lack of consistency of units.	Change sentence to " The permeation rate shall be less than 0.25 millilitre of hydrogen per hour per litre water capacity of the tank, measured at normal conditions of 15°C and 0,1013 MPa."	
FR	C.18		te	Rate of permeation is very low ,it should be linked to a certain level of risk. ,i.e. time before reaching LIE after given number of days in a garage with normal ventilation. For majority of applications value of 1 ml/h/l appears to be very restrictive. We propose 2 ml/h/l for cylinder above 50 l and 5 ml/h/l for cylinders below 50 l for motorcycles applications		

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
JP	C.18	1 <sup>st</sup> line	te	If the cylinder is to be used for both pure hydrogen and hydrogen blends, then the gas tests should be conducted for both hydrogen and hydrogen blends. Aware the big differences between pure hydrogen and hydrogen blends. It should be confirmed that the permeation rates are less than 1 millilitre per hour per litre water capacity for H <sub>2</sub> , and 0.25 millilitre per hour per litre water capacity for CH <sub>4</sub> .		
JP	C.18	Paragraph	te	1ml/hr/litre is too strict. ANSI HGV2 is designed with cars in a parking lot, includes the criteria of permeation rate resulting from discussion based on ventilatory ratio, and ensures 205 times of safety ratio at permeation rate of 2ml/hr/litre.	35Mpa at 2ml/hr/litre and 70Mpa at 2.8ml/hr/litre should be applied as ANSI HGV2.	
US	C.18		te	No tolerance on pressure, and whether or not settled is specified.	Specify tolerance on pressure and whether or not settled.	
US	C.18		te	Capacity is capacity!	Delete "water".	
US	C.18		Te	The noted permeation rate of 1.0 millilitre of hydrogen per hour is arbitrary. Evaluation has shown that 40 millilitres is safe. A rate of 2.0 millilitres of hydrogen is proposed, which still allows a significant factor of safety. The rate of 2.0 is being adopted by ANSI/CSA NGV2/HGV2 and other standards.	... The permeation rate shall be less than <del>4.0</del> <u>2.0</u> millilitres of hydrogen per hour per litre water capacity of the tank, measured at normal conditions of 15°C and 101.3 kPa.	
SE	C.20		te	Clarify that the test is the A50 method	Change "with the method" to "with the A50 method"	
US	C.21		TE	There should be a requirement for aging of the liner.	An aging test per ISO 188 Rubber, Vulcanized or Thermoplastic – Accelerated Aging and Heat Resistance Tests	
SE	C.22		te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003.	A test to be replaced by the following: Sampling Prototype testing - Number of Containers or Liners	



**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
US	C.22		TE	Should there be some consideration with respect to compatibility of the liner material with hydrogen or other additives within the hydrogen fuel (hydrogen blends)?	to be tested: 3 Procedure Special consideration shall be given to safety when conducting this test. At ambient temperature use hydrogen to pressure cycle for 3.0 times the number of Filling Cycles in accordance with Paragraph 2.4.6 of this Regulation, either: i) The Container between $\leq 2.0$ MPa and $\geq 1.25$ times the Nominal Working Pressure, or ii) The Liner between the pressure levels that will provide an equivalent Liner wall stress as would be present at $\leq 2.0$ MPa and $\geq 1.25$ times the Nominal Working Pressure for the Container. Requirement The Containers or Liners shall not fail before reaching 3.0 times the number of Filling Cycles calculated in accordance with clause 4.5 If they do not want to conduct a tensile strength and elongation or a volumetric change after exposure to commercial hydrogen blends, then minimally, a reference to known generic materials suitable for hydrogen service as outlined in ISO TR 15916 Annex C should be included.	
US	C.22			ISO 11114-4, per its title, is applicable to metals. However, its scope identifies its purpose is to "qualify steels suitable for use in the manufacture of gas cylinders", and further states "This standard only applies to seamless steel gas cylinders." This section is referenced by other parts of ISO 15869 in regards to materials other than steels, which is inappropriate. If this section is kept, it must reference	Hydrogen compatibility shall be demonstrated in accordance with ISO 11114-4:- for steels, using a minimum of 3 samples. <u>Hydrogen compatibility for other materials shall be demonstrated by equivalent methods or by use of materials known to be resistant to hydrogen embrittlement.</u>	

**Report of voting on ISO/DIS 15869-1  
Compilation of comments**

Date:2004-12-01  
Reference document: ISO\_DIS\_15869-1

**ISO/TC 197 N 295R Annex B**

1	2	(3)	4	5	(6)	(7)
MB <sup>1</sup>	Clause No./ Subclause No./ Annex (e.g. 3.1)	Paragraph/ Figure/ Table/ Note (e.g. Table 1)	Type of comment <sup>2</sup>	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
US	D.7		te	alternate standards. Specification of in-service inspection requirements is included for normal operation; however, inspection and re-qualification requirements in the likely event of an automotive accident are not addressed.	Recommend including post-accident provisions. The manufacturer should clearly specify the user's obligations for tank inspection and re-qualification following automobile accidents.	
UK	Annex D		TE	Not appropriate to manufacturing standard.	Delete	
UK	Annex E		TE	Not appropriate to manufacturing standard, but possible subject for a standalone standard.	Delete.	
SE	Annex E		te	The DIS varies from the harmonised technical requirements agreed at the joint GRPE/ISO meetings in 2002 & 2003 by adding a significant new informative text. A joint GRPE/ISO meeting should discuss the text.		