Comments that will be addressed by ISO/TC 197 WG 11 in the preparation of the international standard	Date:2008-02-25	ISO/TC 197 **N 393 Annex 2**
		Reference document: ISO/TC 197 N 375

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MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
DE			ge	There are significant technical gaps that still have to be addressed so that this document can serve as a technical resource for resolving differences that currently exist between the various local, regional, and national codes and standards. Without addressing these items, the document will be just another layer of information on top of the conflicting standards that already exist.		
DE	General		ge	Within the German standardization committee on Hydrogen technology, DIN-AA "Wasserstofftechnologie", there was an intense discussion about what vote to issue on ISO/DTS 20012. Some of our members have serious doubts about the safety the draft would provide for vehicle owners filling their H2 vehicle at a station designed according to ISO/DTS 20012, in particular concerning safety distances and earthing of the pad the vehicle is standing on. Only to avoid slowing down the production process of the ISO/TS significantly by producing a new ISO/DTS 20012.2 caused Germany to issue a positive vote. However, should the draft be passed on unchanged for final vote, regardless of the comments received, we would rather vote negative at final stage.	Amend draft in view of safety issues	
NO	The whole draft		ge	The draft in general contains a lot of relevant material, but the text needs editorial reworking to some extent.		
UK			ge	We agree that there would be value in having an international document to address this topic. We have concerns that the inclusion of set-back distances that are not harmonised with either the distances used by participating countries or the methodologies used by participating countries may create additional confusion, rather than facilitating siting hydrogen stations. We also feel it would be unwise to go ahead with publication when the results of a test programme on fuelling protocol is about to be reported and a great deal of effort is still underway to firm up on the safety distances. Since the ISO procedure with a DTS allows publication of the TS as it stands upon meeting approval requirements,		

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				and resolving technical issues in the preparation of the International Standard, we must cast a Negative vote on this item in hopes that a second DTS could be prepared that addresses the UK concerns prior to publication.		
US	General		GE	The document needs to address hazards in a comprehensive and technically sound manner such that the information can be used to encourage global harmonization. The sheer number of comments raised by our technical experts raises questions relative to the technical adequacy of the current draft. Additionally, there are significant technical gaps that still have to be addressed so that this document can serve as a technical resource for resolving differences that currently exist between the various local, regional, and national codes and standards. Without addressing these items, the document will be just another layer of information on top of the conflicting standards that already exist. The U.S. DOE and private companies are actively funding work to address the technical gaps discussed with regard to fuel dispensing and risk-informed separation distances, and we welcome the opportunity to share results when they become available. Quite simply, there is a lot more work to done, before this document is useful as a technical specification.	See the numerous comments listed below Clauses 1-20. See comments for Clauses 11.7-11.8 and 13.2	
AT	1	Paragraph 1	ge	Dispensing of gaseous hydrogen not only to land vehicles but also to ships.		

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NO	Scope	3rd paragr.	ed	The scope needs some editorial reworking. "Delivery of hydrogen by pipeline, trucked in gaseous and/or liquid hydrogen" shall not be equally to the other dash points without any further specifications. Delivery of raw materials and utilities for the onsite production of hydrogen gas is obvious, and do not need to be included in the model. Delivery of hydrogen gas by trailer is on an equally line with onsite production, but it could be better to cut the line with "Liquid hydrogen storage". Further it may be that liquid hydrogen will need some compression after evaporation? Will this be an option?		
NO	Scope	3rd paragr. Dash 3	ed	Liquid hydrogen storage …. Vaporizing systems	Liquid hydrogen storage with an evaporation system	
AT	1	listing	te		• Cold fill device for cooling of hydrogen e.g. by liquid nitrogen to compensate the warming up of hydrogen at a throttle (due to the negative Joule Thomson Coefficient at high pressures)	
AT	1	Figure 1	te		insert "Cold fill device" into the schematic between "Gaseous Hydrogen Buffer Storage" and "Dispenser"	
FR	1	Fig 1	Ge/ed	Arrow from 'Electricity supply' box does not point to anything? Electricity supply is used for all applications?	Suggest 'Electricity supply' box is deleted and additional bullet item is added to list of Fuelling Station components: - Utilities supply (water, electricity, natural gas, phone, etc) as required	
IN	1	Figure 1	ed	Electricity supply arrow kept isolated without showing any interaction	The electricity supply arrow should be moved to location proximate to Hydrogen generation by water electrolysis.	

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UK	1		ge	The DTS does not appear to explicitly state that it is a design TS covering the hydrogen generation equipment and storage and dispensing systems. The scope should be clearly stated and reference made to the other documents needed to deal with operations and maintenance of such systems.	Clarify scope and refer to appropriate documents for operations and maintenance.	
US	1: Scope	Fig 1	Ge/ed	Arrow from 'Electricity supply' box does not point to anything? Electricity supply is used for all applications?	Suggest 'Electricity supply' box is deleted and additional bullet item is added to list of Fuelling Station components: - Utilities supply (water, electricity, natural gas, phone, etc) as required	
CA	1 Scope and 3.4 Definitions	Pages 1 and 4	te	"Gaseous hydrogen buffer storage" used in the illustration of the scope on page 1 shows ground storage that is generally understood to have (much) higher pressure than regular buffer tanks that normally serve as intermediary and relatively small quantity storage of hydrogen with the main purpose to smoothen a compressor system operation.	Suggest develop two new definitions under 3.4 hydrogen stationary storage: 3.4.1 buffer storage tanks to read "pressurized tanks that are normally located between a hydrogen generator and a compressor for an even flow of gas to the compressor" and 3.4.2 ground storage tanks to read "pressurized tanks that are located between the compressor and dispenser to accumulate high pressure gas supply for vehicle fuelling".	
CA	2		te	There are 41 normative references in this standard. Some of these standards may be used for general guidance and no not need to be normative. In addition, some of these standards may be in direct conflict with national codes.	Review the normative standards list to see if some can be referenced in the Bibliography or removed. Pick out the relevant parts of the referenced standards to include in 20012.	
US	2: Normative references		TE		Consider reference to ISO 11114-4:2005, *Transportable gas cylinders—Compatibility of cylinder and valve materials with gas contents—Part 4: Test methods for selecting metallic materials resistant to hydrogen embrittlement.*	
AT	3	listing	te		• **Cold fill device:** device for cooling of hydrogen prior to dispensing	

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FR	3		Te	Definition for 'Fitting' is missing. Reference to 'Fittings' is made in later in TS e.g. Cl 16.1.2	Include definition for 'Fitting': An item in a piping or tubing system that is used as a connector, such as an elbow, return bend, tee, union, bushing, coupling, cross or nipple, but not including such functioning items as a valve or pressure regulator.	
US	3: Terms & Definitions		TE	Definition for 'Fitting' is missing. Reference to 'Fittings' is made in later in TS e.g. Cl 16.1.2	Include definition for 'Fitting': An item in a piping or tubing system that is used as a connector, such as an elbow, flange, return bend, tee, union, bushing, coupling, cross or nipple, but not including such functioning items as a valve or pressure regulator.	
IN	3.2		te	Authority for approving the Facility is missing	Authority definition should include organisation **approving a facility** along with equipment, installation or procedure.	
US	3.5: Terms and definition, AHJ			The abbreviation AHJ for authority having jurisdiction is commonly used in U.S. codes and regulations	**authority having jurisdiction , AHJ** An organization, office, or individual responsible for enforcing the requirements of a code or standard, or for approving equipment, materials, an installation, or a procedure. ANSI Z223.1/NFPA 54-2005, National Fuel Gas Code	
DE	3.7		te	Definition for design pressure : The design pressure of a pressure vessel is for the whole vessel, not only for the top side of the vessel.	Suggest deleting "at its top".	
US	3.7 Terms and definition, design pressure		TE	Definition for design pressure : The design pressure of a pressure vessel is for the whole vessel, not only for the top side of the vessel. The safety valve will be installed on top as this is the location where we do not expect liquid.	Suggest deleting "at its top". Exactly what does "at its top refer to? Please clarify.	

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US	3.14 Terms and definition forecourt		TE	Change proposed for clarity	**forecourt** hard surfaced area ~~at the front of the~~ where vehicle ~~fuelling position~~, dispensing operations are conducted including the fueling position and any area underneath a canopy	
US	3.17 Terms and definition **fuelling nozzle**		TE	Change proposed for clarity	**fuelling nozzle** **3.7 Nozzle—**Device connected to a fuel dispensing system, which provides transfer of fuel. This may also be referred to as a refuelling connector. (SAE J2600)	
US	3.18 Terms and definition **fuelling receptacle**		TE	Change proposed for clarity	**fuelling receptacle** Device connected to a vehicle or storage system which receives the station nozzle and permits (SAE J2600) transfer of fuel. This may also be referred to as a fuelling inlet.	
US	3.24: Terms and definition, Hazardous event		ED	Definition for Hazardous event	Suggest : Occurrence of a hazardous situation that will result in a harm to people, property or environment.	
US	3.26 Terms and definition, **hose breakaway device**		TE	Change proposed for clarity	**hose breakaway device** component installed upstream ~~downstream~~ of the dispenser ~~outlet connection~~ nozzle and downstream from the outlet connection to protect the dispenser assembly from damage by vehicles driving away while still connected to the dispenser nozzle	
NO	3.30		ge	'manufacturer' I am not sure that it is correct to include the manufacturer of even a component in a technical system into this scope.	Delete it!	

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SE	3.33	1st para	te	The nominal working pressure/ working pressure is specified at a gas temperature of 15degC in all draft vehicle tank standards. The exception of "or as specified" will not help as a refilling station manufacturer will not know what all vehicle manufacturers use except by referring to a standard.	Delete "or as specified"	
US	3.38: Terms and definition, pressure relief device		Ed	Definition for pressure relief device	Suggest : Device designed to release pressure in order to prevent a rise ….	
IN	4		te	Built-up static charge at H_2 station is dangerous and hence to be taken care of at designing stage.	To add - prevention of static charge build-up at H_2 station.	
NO	4	1st paragr.	ed	'Neighbouring personnel' is an unfortunate word for the more general 'environment' without further specification	.. to minimise the risk of users, operating personnel, properties and environment.	
NO	4	5th paragr.	ed	"Configurations generating the possibility of hazardous confined foreseeable malfunctions and misuse." This paragraph is already covered by the phrases under the 3rd paragraph	Delete it.	
UK	4		ge	There appears to be no reference for approval of the facility by the local authority (as would be required for petrol stations in he UK). Obviously different countries have differing requirements.	Add reference for entire station design and layout to be approved by the local authority having jurisdiction.	
US	4	Para 2	TE	"Any" is not realistic.	Consideration shall be given to potential hazards in relation to the location and operation of the facility.	
IN	5.1.1		te	Adequate venting of Hydrogen in storage & delivery area to be ensured.	-	
US	5.1.1	Para 5	TE	All gates shall be **outward opening** and wide enough to provide for an easy access and exit of authorized personnel. Gates shall not allow entry without a key during normal operation. In very congested areas, example New York City, the local fire codes require gates to open inward.	All gates shall open outward or comply with the local fire and building codes. The gates shall be wide enough to provide for an easy access and exit of authorized personnel. Gates shall not allow entry without a key during normal operation.	

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DE	5.1.2		te	It is not clear: Should the site have a separate earth ground or the same earth ground as the fixed storage ground?	All delivery vehicles shall be electrically connected to ground prior to flexible hose connection.	
FR	5.1.2		Te	Scope is installation, but requirement refers to operations + Requirement is specific to trailers	Replace first sentence by : Means to ground trailer prior to flexible hose connection shall be provided. Move this sentence to 5.2.1, inserting it between 4th and 5th paragraph	
NO	5.1.2	2nd paragr.	te	If the efficiency of the grounding is not acceptable, there shall be no operation of transfer from delivery vehicle to storage tank or whatever.		
US	5.1.2		TE	All delivery vehicles shall be electrically connected **to ground** prior to flexible hose connection. Is this a grounding or bonding issue? Should the site have a separate earth ground or the same earth ground as the fixed storage ground?	All delivery vehicles shall be electrically connected to the same earth ground as the fixed storage hardware prior to flexible hose connection.	
US	5.2		ED	Remove subsections for tube trailers and MCP and put all requirements into section 5.2	Gaseous hydrogen supply by tube trailers and Multi Cylinder Packs (MCPs)	
US	5.2.1		ED	Move all of subsection 5.2.1 into section 5.2 and remove subsection 5.2.1. Add " or MCP " after each instance where tube trailer is used . see example in box at right…	Minimum clearance of 1 m shall be maintained on all sides of each tube trailer or MCP.	
DE	5.2.1	Para 2	te	Safety distances have to comply with national regulations.	Safety distances shall comply with Clause 13.2.2 for gaseous hydrogen systems, or national or regional regulations.	
US	5.2.1	Para 4	TE	Safety distances shall comply with those given in Clause 13.2.2 for gaseous hydrogen systems. What about the model codes and building and fire regulations? Need to have careful understanding of risk. Numbers should not be unnecessarily restrictive.	Safety distances shall comply with those noted in national or regional regulations or those in Clause 13.2.2 for gaseous hydrogen systems.	

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US	5.2.1	Para 4	TE	Safety distances shall comply with those given in Clause 13.2.2 for gaseous hydrogen systems. What about the model codes and building and fire regulations?	Safety distances shall comply with Clause 13.2.2 for gaseous hydrogen systems, or national or regional regulations, as recognized by the local authority having jurisdiction (AHJ)	
US	5.2.1	Para 5	GE	The tube trailer stationing area shall be level and horizontal. Front and rear ends of the tube trailer bays shall be kept open. A bump stop shall indicate normal tube trailer position.	It is not clear. Add a definition for bump stop.	
US	5.2.1	Para 5	GE	The location of the pressure reducing station shall be accessible.	Clarify pressure reducing station in text.	
US	5.2.1		TE	Other methods just as effective should be permitted.	Change to read: A bump stop, or other approach that is just as effective, shall indicate normal tube trailer position.	
FR	5.2.2		Te	This section addresses supply by multi-cylinder pack + Scope is installation, but requirement refers to operations	Replace first sentence by : Means to ground multi-cylinder packs prior to flexible hose connection shall be provided	
US	5.2.2	Para 1	GE	Multi cylinder pack trailers shall be electrically connected to ground prior to flexible hose connection.	Clarify multi cylinder pack trailers	
US	5.2.2	Para 1	TE / ED	Move all of subsection 5.2.2 into section 5.2 and remove subsection 5.2.2. Add reference for MCP as shown at right	Multi-cylinder packs and tube trailers shall be electrically connected to ground prior to flexible hose connection.	
US	5.2.2	Para 2	TE/ ED	Move all of subsection 5.2.2 into section 5.2 and remove subsection 5.2.2. Add reference for MCP as shown at right	The storage area shall be fenced to prevent access of unauthorised persons. Activities other than those directly related to the hydrogen tube trailer and / or MCP operation shall not be permitted in the ~~vicinity of the trailers.~~ hydrogen storage area.	

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US	5.2.2		TE	These requirements should apply to all trailers.	Change to read: ~~5.2.2 Multi cylinder pack~~ ~~Multi cylinder pack~~ Trailers shall be electrically connected to ground prior to flexible hose connection. The storage area shall be fenced to prevent access of unauthorised persons. Activities other than those directly related to the hydrogen tube trailer operation shall not be permitted in the vicinity of the trailers.	
FR	5.3	5.3.1 (1st par.)	Te	Recommend clarification on what is meant by: '(storage tanks in 2 or 3 sided zone)'? Many readers will not understand this terminology?	Suggest a note of clarification or provide a definition in Cl 3.	
US	5.3: Liquid hydrogen supply	Cl 5.3.1: Liquid hydrogen storage layout & design features (1st para)	TE	Recommend clarification on what is meant by: '(storage tanks in 2 or 3 sided zone)'? Many readers will not understand this terminology?	Suggest a note of clarification or provide a definition in Cl 3.	
DE	5.3.1	Para 2	te	Safety distances have to comply with national regulations.	Safety distances shall comply with Clause 13.2.1 for liquid hydrogen systems, or national or regional regulations.	
US	5.3.1	Para 2	TE	Safety distance requirements	Safety distances shall comply with Clause 13.2.2 for gaseous hydrogen systems, or national or regional regulations, as recognized by the local authority having jurisdiction (AHJ)	
US	5.3.1	Para 4	TE	Any firebreak walls or partitions shall be made of brick, concrete or any other suitable non-combustible material of 90 minutes rating.	Please reference a specific standard to determine 90 minute rating.	
US	5.3.1	Para 8	TE	Dykes, diversion kerbs or grading shall be used to ensure that liquid leakage from adjacent combustible liquid or liquid oxygen storages installed at a higher level than the liquid hydrogen storage, is prevented from accumulating within 15 metres of the liquid hydrogen storage.	Delete "or liquid oxygen". Why would LOX be at a filling station?	

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DE	5.3.1 Liquid hydrogen storage layout and design features	Para 1	ge	To minimize the consequence of an accidental leakage, liquid hydrogen storage tanks should not be enveloped or constricted by walls or buildings. General prohibition of walls around LH2 storage tanks is unnecessarily restrictive. Each case of installation has to be examined separately by risk analyses. Underground storage tanks for LH2 are not in the scope of this document so far. We propose to create a separate chapter for below ground installations.		
DE	5.3.1 Liquid hydrogen storage layout and design features	Para 1	ge	Liquid hydrogen (storage tanks in 2 or 3 sided zone) should also be avoided as much as possible to prevent accidental gas confinement, if leakage occurs. Wording can lead to misunderstanding General prohibition of walls around LH2 storage tanks is unnecessarily restrictive. Each case of installation has to be examined separately by risk analyses.		
DE	5.3.2 Liquid hydrogen transfer area	Para 3	ge	The fill coupling shall be located within the area of the liquid hydrogen storage tank plinth. Wording with the expression “plinth” is unnecessarily restrictive. State of the art for LH2 storage tanks is “concrete foundation”.	The fill coupling shall be located within the area of the liquid hydrogen storage tank concrete foundation.	
AT	5.3.3	Paragraph 2	te	Addition of a safety factor?	?	
US	5.3.3	Para 2	TE	The tank foundation shall be designed to withstand the weight of the liquid hydrogen storage tank, its contents and other possible loads applied by wind, snow, seismic, etc.	Add seismic. Seismic was not listed as one of the loads.	
AT	5.3.4		ed		This paragraph should be omitted as we are talking about "gaseous hydrogen"	
US	5.3.4	Para 2	TE	Liquid hydrogen delivery lines shall include a non-return valve or an emergency isolating device preventing outflow in case of hose rupture	What does this mean? Is a check valve needed on the hose to the stationary tank connection? Is a flow limiter valve required for the vehicle tank?	

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CA	5.3.5	5th and 6th paragraphs	ed, te	In a three way valve, there can be a neutral position where there will be no flow going to the valve outlets	"Three way valve" to be replaced by "three way *diverter* valve"	
FR	5.3.5			With three way valve, means to bleed pressure before maintenance needs to be provided	Insert before next to last paragraph : For maintenance, a bleed valve allowing to safely relieve pressure shall be provided.	
UK	5.3.5		te	There is no requirement specified to fit flame arrestors on vent pipes.	Add requirement or guidance.	
US	5.3.5	Para 3	TE	A secondary pressure relief device such as a bursting disc shall be installed together with the primary pressure relief device of the liquid hydrogen storage tank.	Why is a second PRD required? Explain the requirement.	
AT	5.3.6	Paragraph 4	te	Usage of non-return valves	If the vent stacks are connected to other gases than hydrogen, they shall be equipped with non-return valves to avoid any back-feed into the hydrogen vent stacks.	
AT	5.3.6	Paragraph 5	te	The natural buoyancy of hydrogen may be amplified (e.g. by warming the hydrogen gas)		
FR	5.3.6		Te	Venting is addressed in par. 17.	- Refer to par. 17 - Move first three paragraphs to par. 17.	
IN	5.3.7		te	Piping insulation should be flame proof.	-	
FR	5.3.8	Last 'bullet point'	Ed (typo)	- Product identification (should be in CAPITALS?)	To be written as: - PRODUCT IDENTIFICATION	
SE	5.3.8	3rd para	ed		Change "The following markings…" to "The following signs…"	
FR	5.3.9	7	Te	There are many means to accomplish this and not all are on the discharge of the vaporizer.	Should read : "A means to stop flow shall be installed should low temperature downstream of the vaporizer be detected."	
FR	5.3.9	9		Why must all parallel vaporizers require block valves on the inlet and discharge of each vaporizer?	Delete	

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US	5.3.9		ED	Strengthen the wording in the first para.	Changer to read: The vaporizer and its piping shall be protected with pressure relief devices ~~as required~~.	
US	5.3.9	Para 2	TE	Pressure relief valves on heated vaporizers shall be located so that they are not subjected to temperatures exceeding 60℃ during normal operation unless they are designed to withstand higher temperatures.	Is this a TSV or PSV requirement? If it is a TSV requirement, will it tolerate the thermal 'suck back' levels of Greece, Turkey, Spain, or the Southwest U.S.?	
SE	5.3.10	Title	ed		Change the title to "Signs and instructions".	
SE	5.3.10	1st para	ed		Change "Notices shall be clearly displayed…" to "Signs shall be clearly displayed…"	
DE	5.3.11	Para 2	te	It is unclear, if Nitrogen purge is allowed or not.	Delete the 2nd sentence of 5.3.11	
US	5.3.11	Para 2	TE	Purging cold sections with nitrogen will result in nitrogen ice and potentially very serious problems	Following installation or repair work, cold sections of liquid hydrogen installations shall be purged with helium or ~~nitrogen~~ warm hydrogen.	
FR	5.4		Te	Means to relieve pressure and purge with nitrogen need to be provided	List functions with "bullets". After : isolation for maintenance or emergency add : safe relief of pressure and nitrogen purging	
NO	6.2.1		ed	The sub clause contains location requirements and other design details that are common requirements for the whole plant.	The 1st paragraph could be transferred to 13.1. The 2nd paragraph can be deleted. The 3rd paragraph can be deleted.	
NO	6.2.3		ed	The content of this sub clause is covered under the requirements of clause 18.	Delete 6.2.3	
UK	7		te	There appears to be no reference to the standard of isolation required. e.g., Section 7 of the DTS refers to Hydrogen Compressors and maintenance. Is it acceptable to rely on a single isolation for maintenance when compressors in parallel are running and a single compressor is being worked on. Or are double isolation valves and vent required?	Clarify required isolation.	

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FR	7.1	2nd par.		Need to include means to vent pressure and purge with nitrogen	After 1st sentence, insert : There shall exist means to relief pressure and purge with nitrogen prior to maintenance operations	
US	7.1	Para 1	TE	Some compressors can have a very negative effect on hydrogen quality	All types of compressors may be used provided that they have been designed with particular reference to hydrogen service and do not introduce contaminants or impurities into the process fluid (hydrogen) .	
DE	7.1 General	Para 1	te	Some compressors can have a very negative effect on hydrogen quality	All types of compressors may be used provided that they have been designed with particular reference to hydrogen service and do not introduce contaminates or impurities into the process fluid (hydrogen).	
AT	7.3		ed	Add new section 7.3: Compressor enclosure. Clauses 7.3 to 7.5 change to 7.3.1 to 7.3.3 accordingly	**7.3 Compressor enclosure** The compressor shall be placed inside an enclosure providing protection against environmental influences. For the construction of the enclosure the following shall be considered: **7.3.1 Compressor enclosure ventilation** … **7.3.2 Attachment to other buildings** … **7.3.3 Enclosure access doors** …	
NO	7.3		te	Such requirements are part of a compressor standard. Do not interfere with the compressor standard	Delete 7.3	
US	7.3	1st paragraph	TE	There is no specification of the required ventilation configuration that will prevent H2 accumulation, either by enclosure designer or user.	The ventilation required for a compressor enclosure should be at least as stringent as the ventilation requirements for dispenser cabinets and any other permitted enclosure on the station. Suggest that the space be normally less than 25% LFL and all equipment be rated for space per IEC60079. Consider referral to a general section within this document that addresses general requirements such as Section 14 (that should address these issues).	

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US	7.4	Para 2	TE	Where a compressor enclosure shares one wall of an existing building, the shared wall shall be gas-tight and have at least a 2-hour fire resistance rating.	What is the basis of this requirement? What about regional and national regulations?	
NO	7.5		te	Such requirements are part of a compressor standard. Do not interfere with the compressor standard	Delete 7.5	
IN	7.6		te	Safety controls should include H_2 leak detectors	-	
US	7.6.6		GE	Where the motor and auxiliary equipment are pressurised by an inert gas such as nitrogen, low pressure/flow shall be indicated by an alarm, which shall be arranged to shut down the motor and auxiliaries.	Is this a NFPA 496 type requirement? If so, please reference the source.	
US	7.6.6			It is more likely that control panels will be purged than motors.	Where the motor and / or auxiliary equipment are pressurised by an inert gas such as nitrogen, low pressure/flow shall be indicated by an alarm, which shall be arranged to shut down the motor and / or auxiliaries.	
NO	7.6/ 7.6.1/ 7.6.3/ 7.6.4/ 7.6.5/ 7.6.6/ 7.6.7		te	Such requirements are part of a compressor standard, and partly belongs to the requirements of 18. Do not interfere with the compressor standard	Delete	
US	8	3rd paragraph	TE	There is no specification of the maximum allowable interval between checks of either the filter itself or the differential pressure indicated on the monitor.	There should be a general requirement for the specification of Preventive Maintenance as specified by the manufacturer or integrator.	
CA	10 Gaseous hydrogen buffer storage tanks	Page 16	ed	Adjust text as per above comment	Change the section's title to read "Gaseous hydrogen buffer and ground storage tanks". Adjust text in the section accordingly.	
CA	10 Gaseous hydrogen buffer storage tanks	Page 16	te	ISO 16528-1 does not address the use of composite tanks. It is very important that composite cylinders be used for 70 MPa fueling. It is very difficult to produce steel tanks for the high pressure. Also, ISO 16528-1 excludes gas cylinders from the scope.	Allow the use of other composite tanks by adding references to ISO 11119 and ISO/DIS 15869 as alternative options subject to approval of national/local AHJs. Additional wording is required to incorporate these standards for use as ground storage tanks.	

1	2	(3)	4	5	(6)	(7)
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FR	10		Te	Need to address effect of hydrogen	Insert after 1st par : - Vessels for the storage of hydrogen shall be designed, fabricated and inspected in accordance with a recognised pressure vessel code and the following requirements: - The actual yield strength of the material shall be no greater than 420 MPa. The actual tensile strength of the material, shall be no greater than 630 MPa. The material shall be in the normalised condition. - The material shall have specified values for toughness at -20℃. according to the pressure vessel code. - The carbon equivalent shall conform to the following requirement $Ceq = C + \frac{Mn}{6} + \frac{(Cr + Mo + V)}{5} + \frac{Ni + Cu}{15} < 0.45$ A fatigue analysis based upon the design cyclic duty should be performed. The analysis should include the effects of hydrogen which are reported in the literature. - Local stress raisers shall be minimized a. Appropriate design and positioning of nozzles, manholes, supports and attachments and the selection of suitable weld details. Penetration welds are preferred. b. Ensuring welds have uniform profiles that are well blended into the surface of the parent plate and free of undercut or over reinforcement. c. Avoiding gouges, scrapes, grinding marks and weld splatter during manufacture. The	

1	2	(3)	4	5	(6)	(7)
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					maximum depth of the defect shall not exceed 5% of the wall thickness. d. Employing plate rolling techniques that minimise peaking. (- The hardness of welds and the heat-affected zone shall be less than 250 HV - The inside and outside surface conditions of all main seam welds should be prepared to a standard suitable for either ultrasonic testing or magnetic particle inspection. - The vessel should be protected by suitable overpressure protection adequately sized for all foreseeable events, including an uncontrolled gas release from a filling trailer (if applicable). Both the position of the overpressure protection with respect to the vessel and the sizes of connecting lines shall be taken into account when designing the protection system.	
NO	11		ed	The clause has a misleading title. The whole clause should be edited.	Use the title of 11.3 'Dispenser system design' instead. This title is much more covering the whole.	
UK	11		te	There is a testing program sponsored by 6 major vehicle manufacturers and energy companies that is underway to establish the fuelling protocol, which will finish by December of this year. The DTS should include the protocol so that vehicles could use fuelling stations safely on a global basis.	Include agreed fuelling protocol.	
AT	11.1	Paragraph 2	te	"… attached to a structure at last 4.24 m above the fuelling position" ?	??	

Comments that will be addressed by ISO/TC 197 WG 11 in the preparation of the international standard	Date:2008-02-25	ISO/TC 197 **N 393 Annex 2**
		Reference document: ISO/TC 197 N 375

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
CA	11.1		te	In some cases dispensers are not mounted on concrete islands because they are integrated as part of the compressor package (e.g. in mobile refuelling units).	"Dispensers shall either be located on a concrete island or plinth at least 120mm...." change to "Dispensers located on a concrete island or plinth shall be at least 120mm...."	
JP	11.1 Location and protection of dispensers	2nd para.	te	(Original) "Dispensers shall either be located on a concrete island or plinth at least 120 mm above grade or attached to a structure at least 4.25 m above the fuelling position. The exceeding of the island to each side of the dispenser shall be 200 mm minimum." (Comments) • The reasoning behind the minimum requirement of 4.25 m is not given. For suspended gasoline dispensers, the legal requirement in Japan is simply "4.5 m or less." • The reasoning behind the excess of 200 mm for the island from the dispenser is not given. There are no requirements for any type of dispenser in Japan.	Explain the reasoning behind the "at least 4.25 m above the fuelling position. and 200 mm minimum."	
US	11.1	1st paragraph		"except where the canopy is not capable of accumulating gas in pockets or between the canopy ceiling and roof." What does this mean?	Clarify description of canopy design that will prevent accumulation in pockets or under roof. One clarification might be the requirement for a high point vent.	

1	2	(3)	4	5	(6)	(7)
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JP	11.2 Fuelling position	2nd para.	te	(Original) "The vehicle fuelling pad shall be made of non-combustible materials allowing electrical grounding before the nozzle is connected to the vehicle." (Comments) ・ What does this "the vehicle fuelling pad" refer to? ・ Argentina actually requested to get "vehicle fuelling pad" defined, but it was dismissed. Why? ・ "The vehicle fuelling pad" should be defined. Otherwise the document can't stand on its own as a standard.	・ Describe the definition of the pad as follows; ・ "The vehicle fuelling pad is a pad for removing any static accumulation from the fuelling person" ・ "the vehicle fuelling pad is placed for the purpose of removing static from the vehicle. "	
SE	11.2	1st para	te	The requirements of "level" and "provide normal surface water drainage" are not compatible.	Replace the 1st para with "The vehicle fuelling position shall be level, except for a minimal slope to provide normal surface water drainage.	
UK	11.3		te	Need to consider the possibility of hydrogen heating up when being compressed, a consequence is that the pressure in the vehicle tank will increase and the temperature will also rise. The filling station controls and equipment design conditions will need to recognise these conditions and compensate accordingly. Specified equipment design conditions will also need to reflect these operating conditions.	Add language to section 11.3 to address this issue.	
FR	11.3.1	Last par.	te	Requirement not clear	Delete	
IN	11.3.1		te	Remote shut down for dispenser should be provided in case of emergency.	-	
FR	11.3.2		te	Object not clear	Move 1st par and 3rd par. to 11.3.1 Delete 2nd par	

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US	11.3.2	1st paragraph		A manually operated shutoff is not sufficient to allow maintenance on dispenser.	There should also be a requirement for a vent to allow the fuel line in the dispenser to be vented and possibly purged before any work is done inside dispenser. Portable or fixed gas detector should be used to verify H2 concentration is less than 0.4% before allowing general electrical equipment and tools in dispenser.	
CA	11.3.4	1st paragraph	te	In clauses14.4, 14.5 and 15.2.6, there is no specification on the ventilation rate or ventilation openings. The size of 100 cm2 for the ventilation opening should be removed for consistency purposes.	"Two openings of at least 100 cm2..." to be replaced by *"Two openings"*	
FR	11.3.4	1st par.	te	Too prescriptive	Insert at beginning of second sentence : This may be achieved by two openings……	
FR	11.3.4	2nd par.	te	Needs clarification	Replace by : Normal operation shall not generate an explosive atmosphere in the dispenser cabinet.	
NO	11.3.4	2nd , 3rd paragr.	te	Why design for a pressure relief device within the dispenser cabinet?	Delete the paragraphs.	
NO	11.3.4	4th paragr.	te	What are fail safe means? I thought it was a position of a valve, or automatic ruled device, and as such process dependent. Do not install a detector within a dispenser cabinet. Apply welded piping as much as possible to avoid leakages. In addition these requirements shall be covered under clause 18.	Delete the paragraph	
US	11.3.4	1st paragraph	TE	There is no specification of required forced ventilation rate for the dispenser enclosure, and the specification for the natural ventilation is not related to the enclosure size or to the maximum allowable concentration and buoyant layer depth in the enclosure.	Suggest that the space be normally less than 25% LFL and all equipment be rated for space per IEC 60079. Consider referral to a general section within this document that addresses general requirements such as Section 14 (that should address these issues).	

1	2	(3)	4	5	(6)	(7)
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US	11.3.4	4th paragraph	TE	The paragraph should provide an alternative to installing gas detectors in the dispenser enclosure.	Besides the ventilation specified in the first paragraph, another means of preventing H2 entry and accumulation is the use of an air or nitrogen purged or pressurized enclosure. See IEC 60079 for purged enclosures.	
DE	11.3.4 Prevention of explosive gas atmosphere	Para 1	ge	The interior of the dispenser cabinet shall be adequately naturally or force-ventilated. When naturally ventilated, two openings of at least 100 cm2, one at the top of the dispenser and one at the bottom shall be provided. These two openings shall be positioned on oppose ensure sufficient cross-ventilation. Wording is unnecessarily restrictive. This should be the result of detailed investigations (e.g. HAZOP study)	Appropriate means shall be provided. This should be the result of detailed investigations (e. g. HAZOP study)	
DE	11.3.4 Prevention of explosive gas atmosphere	Para 3	ge	Fail-safe means shall be provided to detect any leaks, which could lead to an explosive atmosphere inside the dispenser cabinet. This can be done by a gas detector installed within the dispenser cabinet set to interrupt the gas supply when it detects a volume fraction of hydrogen in air greater than 1 %, or by means of frequent pressure integrity checks as indicated in Clause 11.7.3. Fail-safe means … is unnecessarily restrictive	Appropriate means shall be provided. This should be the result of detailed investigations (e. g. HAZOP study)	
FR	11.3.5		te	Purging with N2 may be required prior to dismounting	Means to purge filter with nitrogen shall be provided if the internal volume exposed to atmosphere during maintenance exceeds 1 L	
UK	11.4	11.4.4	ge	There is a requirement to periodically inspect, leak check, and replace hoses at end of their cycle life. This is a procedural requirement, not a design requirement, and therefore is outside the scope of the DTS.	Remove requirements and instead refer to appropriate standard.	
FR	11.4.1		te	First paragraph redundant with subsequent content	Replace first par with : The fuelling hose assembly shall be rated for the maximum fill pressure.	

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FR	11.4.2	2nd par.	te	Risk of corrosion due to piercing	At end of 2nd par add : In this case, materials used shall withstand the moisture ingress	
FR	11.4.2	6th par.		What is the justification of requirement : The fuelling hose outer sleeves shall be constructed of non-electrically conductive materials.	Delete	
JP	11.4.2 Fuelling hose construction	7th para.	te	(Original) "On fuelling hose assemblies that incorporate a vent line, the vent line shall have a design pressure equal to or greater than that of the fuelling hose. The vent line shall also maintain or have the same electrical conductivity requirements as the fuelling hose." (Comments) • The vent line is exclusively for venting out. As such it will have no valves controlling the flow. Piping resistance will be coming only from a backfire prevention device or check valve. Therefore there is no need to match the pressure of the fuelling line.	• Change the sentence of "the vent line shall have a design pressure equal to or greater than that of the fuelling hose." To; • "The maximum allowed working pressure shall be greater then the maximum pressure drop which could occur while venting gas" OR □ Delete these two sentences.	
NO	11.4.2		te	A hose is normally made of flexible material. Flexible materials are not exposed to corrosion. Corrosion is a destructive oxidation process of metallic materials	Delete the point	
CA	11.4.3		te	What is a "suitable restraining cable or device" to restrain hose movement?	remove requirement	

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JP	11.4.3 Fuelling hose fitting	3rd para.	te	(Original) "For design pressures in excess of 4 MPa, assembled fuelling hoses should be provided with a suitable restraining cable or device, fitted to an anchor point to restrain the hose movement in the event of a fuelling hose assembly failure." (Comments) • In order to fulfil this requirement, the hose must be restrained at a location closer to the supply side from the failure, if it should fail. Since there is no way of knowing where the hose would fail, it is necessary to restrain the hose in its entirety, which is impractical. It is more practical to implement measures by which the release of hydrogen to air, the very cause of the hose movements, will be quickly stopped than trying to restrain the violent movements of the hose. For instance, we can require the detection of rapid pressure loss linked to the closure of the shut-off valve.	• Just as mentioned in our previous comments, alternative wording is needed such as shown below: • Insert the following after the sentence • "Alternatively, they may be connected to a control system which will interrupt the fuel delivery instantaneously when such an event occurs." • Or replace with: • " Measures shall be in place to shut off the gas supply immediately to prevent the release of hydrogen into air in the event that the fuelling hose assembly fails.	
DE	11.4.4		te	ISO 14113 is for welding equipment up to 45Mpa, how can this be transferred to H2 fueling hoses with up to 87,5 Mpa?	Delete reference to ISO 14113	
US	11.4.4	5	TE	Requirement to periodically inspect, leak check, and replace of hoses at end of cycle life is a procedural not a design requirement.	Add a section for instruction manuals and rewrite all procedural requirements as requirements for information, preventive maintenance, etc. that manufacturer or integrator must include in their manuals.	

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AT	11.5.1		ed	add Paragraph 4 and Paragraph 7 to the listing Nr. 1 in the listing should not be in the listing	The hose breakaway device shall : • be fit for the purpose; and • disconnect when subjected to a maximum force of 660 N but not less than 220 N when the device is installed as specified by the manufacturer. This condition shall be met at all pressures. • automatically shutoff the source of hydrogen gas to the nozzle when disconnected. • incorporate double shut-off features that isolate both sides of the connection when uncoupled.	
FR	11.5.1		te	"Hose break-away shall shut off …." Redundant with same requirement expressed further down	delete	
JP (JARI)	11.5.1 Hose breakaway device - design	1st & 2nd para.	te	(Original) "A self sealing hose breakaway device shall be fitted in the fuelling hose and vent line to prevent damage to the dispenser and filling lines with subsequent possibility of a serious hydrogen leak in the event a vehicle moves away with fuelling hose still connected to the vehicle"] (Comments) ・ A fundamental question: we are premising on the occurrence of breakaways. Is it all right? In the Japanese experience of stations, most gas leaks occur in breakaways. We are discussing beyond 35 MPa right now. Isn't this type of as-is adoption of CNG approach at 20 MPa too simplistic? (Original) "The hose breakaway shall disconnect when subjected to a maximum force of 660N but not less than 220N when the device is installed as specified by the manufacturer. This condition shall be met at all pressures. (Comments) ・ The maximum force of 660 N comes from the natural gas dispensing system at 20 MPa. This value of 660	・ There is a strong need for more data and close examination thereof in terms of our approach to breakaway devices. ・ Insert some kind of wording after 660 N indicating that ; "the value be modified in the future."	

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				N shall be modified for 70 MPa Hydrogen.		
NO	11.5.3		ed	Electrical conductivity issues are taken care of under 16.5 Equipment Bonding and grounding	Delete it	
SE	11.6		te	What is the maximum quantity of hydrogen that can be released during disconnection?	Add new section: 11.6.4 Disconnection of nozzles The maximum quantity of hydrogen that may be released during disconnection shall not exceed ???.	
IN	11.6.1		te	Design of fuelling connector should be unique to Hydrogen to prevent incorrect filling and provide complete seal.	-	
JP	11.6.3 Depressurization of nozzles	2nd para.		(Originala) "The gas shall be vented to a safe area. If a separate hose is used for this, it must also be fitted with a breakaway device designed to the same requirements as the dispenser hose breakaway device." (Comments) ・ Same as our previous comment. ・ Japanese comment in the last round: "As commented for 11.4.2, it is non-sense to put the same requirement for vent line as filling line. Breakaway device is not necessary for vent line, as long as it is fitted with filling line."	Delete underlined sentence. "The gas shall be vented to a safe area. ~~If a separate hose is used for this, it must also be fitted with a breakaway device designed to the same requirements as the dispenser hose breakaway device.~~"	
DE	11.7		te	The fueling protocol is currently discussed among automotive experts within SAE. It is absolutely necessary to co-ordinate these requirements.	Contact SAE Interface WG for correct data on the fueling process.	
SE	11.7.1	b)	te	The current writing is confusing. The storage maximum fill pressure should be the obvious limitation.	Change b) to: "b) 1,0 times the vehicle storage maximum fill pressure immediately after filling, regardless of temperature."	

Comments that will be addressed by ISO/TC 197 WG 11 in the preparation of the international standard	Date:2008-02-25	ISO/TC 197 **N 393 Annex 2**
		Reference document: ISO/TC 197 N 375

1	2	(3)	4	5	(6)	(7)
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US	11.7.1		TE	Wireless communications (station to vehicle) protocol is not in document. Harmonization of this along with SAE J2799 (published Technical Information Report).	Reference or incorporate into ISO document SAE J2799 for wireless communication vehicle to station protocol.	
US	11.7.1		TE	70 MPa fuelling (receptacle/nozzle) and wireless hardware (IrDA) is referenced in SAE J2799.	Reference or incorporate into ISO document SAE J2799 for wireless communication hardware and connector geometry.	
AT	11.7.2	Paragraph 1	ed		omit this paragraph as it is mentioned below.	
AT	11.7.2	Paragraph 2	ed		move this paragraph to Clause 11.7.4	
CA	11.7.2		ed	Unless there is communications between the vehicle and station, it would be difficult to stop the filling process at or before the on-board vehicle internal gas temperature reaches 85 C. SAE J2601 is now developing a filling protocol to address this issue.	incorporate the developments from SAE J2601	
IN	11.7.2		te	Audible alarm should be provided for end of fill control	-	
JP (JARI)	11.7.2 End of fill control	2nd para.	te	(Original) “Dispensers shall be designed to stop the filling process at or before the on-board vehicle internal gas temperature reaches 85deg.C.” (Comments) We support the concept of the following HGV2 draft. *<HGV2 Draft>* *4.4.2. Container Temperatures* *The temperature of the container materials may vary from -40℃ (-40℉) to 85℃ (185℉). Temperatures over 85℃ (185℉) shall be sufficiently local, or of short en ough duration.*	• After the sentence of 85 deg. C , add; • "Temperatures may go over 85℃ (185℉) in fuelling if sufficiently local or of short enough duration."	

1	2	(3)	4	5	(6)	(7)
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SE	11.7.2		te	One error should not lead to a hazardous situation, in this case a possible tank rupture. This is essential to have in mind when it comes to installations that are supposed to be handled by the public.	Add the following: "The dispenser shall have two non-manual systems, independent of each other, that ensure that the dispensed pressure is temperature compensated according to 11.7.1."	
US	11.7.4, 11.8.2, and 11.8.3.		TE	SAE J2601 describes a "Fuelling Pressure corridor for 70MPa hydrogen fuelling" (see example next page) which would allow all OEM vehicles to fuel within the same timeframe. A Pressure Ramp rate "Fueling Corridor" should be utilized for fueling protocol to ensure that vehicles are fueled in a consistent manner. There is a testing plan underway at Powertech in this regard, which will be finished by December of this year. Participants in this data project are automakers sharing fueling data See attached conceptual example of a pressure fueling corridor.	Consider the Fuelling Pressure corridor in SAE J2601 (expected in the spring of 2008) and define appropriate protections to potentially hazardous situations based on subsequent discussions with interfacing industries.	
AT	11.7.5		te	Calibration of the metering device?	?	
US	11.7 and 11.8		TE	Safety protections during fill will be critical as vehicles do not have any protections for this mode. Fueling corridors are being defined by SAE, for example, and these corridors will need protective actions to be performed when the corridors are violated to prevent possible over-fill, over-pressure, over-temperature, or system leak. The dispenser control will need a high degree of reliability to adequately protect the public including internal fault detection. For example, assume an H2 car has a 300 mile range and drives 15,000 miles per year. • That is 500 fills per year or, allowing for partial fills, 1000 fills per year per vehicle. • For a mature H2 economy with 200 million vehicles on the road, that results in 200 billion fills	Items in Sections 11.7 and 11.8 that are specific to control/safety of the dispenser should be collected and moved to 11.3 such that all dispenser requirements – hardware and software – are in one section. Consideration should be given as to what measures and how to present reliability requirements to ensure the level of protection desired at the dispenser. We suggest that a combination of performance-based requirements and a risk analysis may be appropriate to provide flexibility and avoid over-prescription.	

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				per year for the entire U.S. • If we allow two overpressure or over temperature events per year in the country, that results in an overall failure rate of one per 10^11 fills. • If we assume there are 10^5 H2 fueling stations in the mature H2 economy, then the failure rate per station is 10^-6 per station per fill. Such devices (products) typically bare their own product (type) certifications as the verification and production controls do not lend themselves for review at the site. Automatic closure of the fail-safe shutoff is appropriate if any of the deviations noted above occur.	Consider the possible development of a separate document for dispensers to facilitate future product certification. Failure detection and automatic closure of the fail-safe fuel shutoff is required to protect against hazardous situations, but these functions have not been fully defined and agreed to by the various interfacing industries.	
NO	11.7/ 11.8/ 11.9		ed	These sub clauses and all their sub clauses are covered under clause 18. If we need more details, below one sub clause.		
UK	11.8	11.8.3	te	The DTS requires a manual ESD activation means to be provided at the dispensing area. This will give the general public access the ESD and make the fuelling system vulnerable to nuisance emergency shutoffs. Providing an ESD at the dispenser is not common practice for petrol stations. If there is an incident at a dispenser, attempting to access an ESD there may actually put the operator in a greater hazard than if they simply evacuated the area. In addition, local authorities may have specific requirements for location of ESD activation.	Change paragraph as follows: A manual ESD activation means shall be provided at a location remote from the dispensing area. It shall be clearly identified. Additional manual ESD activation means shall be placed per requirements of the authority having jurisdiction.	
SE	11.8.1		te	Requirements should be given for the venting of the pressure relief valve to a safe place.	Add new requirement.	
US	11.8.1		TE	A PRD event should warrant shutting down of station dispenser.	Station dispenser should be shut off in the even of a PRD event, and operators should be notified.	

1	2	(3)	4	5	(6)	(7)
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FR	11.8.2	2nd par.	ed	Redundant with last par.	Delete 2nd par	
SE	11.8.2	3rd para	te		Replace the 3rd para with "A manually operated shut-off valve shall be required in addition to the automatic measure described above. Access to the manually operated shut-off valve shall be restricted."	
IN	11.8.3		te	Provision of remote emergency shutdown should be made.	-	
US	11.8.3	2	TE	This clause requires an emergency shutoff device (ESD) (essentially an emergency stop push button) on every dispenser. This will give the general public access the ESD and make the fueling system vulnerable to nuisance emergency shutoffs. Providing an ESD at the dispenser is not common practice for gasoline fueling stations. Hydrogen is as safe if not safer than gasoline. And, if there is an incident at a dispenser, attempting to access an ESD there may actually put the operator in a greater hazard than if they simply evacuated the area.	Change 2nd paragraph to: Manual ESD activation means shall be provided inside the fuelling station office and in compressor and storage areas.	
DE	11.8.3 Dispensing emergency shut-down system	Para 1	te	The ESD, when activated, shall also shut off the power supply … Shut off of the power supply is not mandatory necessary	The ESD, when activated, shall shut off the hydrogen supply to the compressor and the dispenser.	
DE	11.8.3 Dispensing emergency shut-down system	Para 2	te	A manual ESD activation means shall be provided at the dispensing area and also at a location remote from the dispensing area. It shall be placed at 1,80 m above forecourt level, and clearly identified. Why: …1,80 m above forecourt level?? This is unnecessarily restrictive.		
FR	11.8.3.	1st par.	ed	Redundancy in last sentence	Delete "and the dispenser"	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
AR	11.9		Te	It is indicated that: …International symbols for "NO SMOKING" and "IGNITION OFF" at least 50 mm in diameter coloured red and black on a white background shall be prominently displayed within 3 m of a the fuelling point.	Symbols of 50 mm in diameter seems to be very small. The text needs to refer to symbols that should have letters of minimun height of 50 mm.	
US	12	Para 4	TE	Multiple grades of hydrogen are to be strongly discouraged.	If multiple grades of hydrogen are offered, each grade of fuel shall be identified on the dispenser. A warning shall inform the customer that only Grade D shall be used for road vehicles that are powered by proton exchange membrane (PEM) fuel cells.	
UK	13		ge	Section 13 refers to the layout of the refuelling station. Requirements given here could be more comprehensive. Guidance on aspects of safe traffic movement e.g., movement of hydrogen tankers and the need to provide layouts which avoid the need for the tanker to reverse, the ability of vehicles to move quickly out of the way in an emergency are needed.	Add guidance.	
AT	13.1		te		Compressed gaseous hydrogen dispensers shall be located in such a way to avoid vehicles driving through or stopping in potentially hazardous areas	
AT	13.1	Paragraph 7	te		A minimum illumination of 300 Lux shall be provided	
IN	13.1		te	Layout of gas station should be subject to regulatory approval.	-	
AR	13.2		Te	Adopted values shall be explicitly harmonized with other standards for example NFPA	Adopted values shall be explicitly harmonized with other standards for example NFPA	
DE	13.2		te	Safety distances have to comply with national regulations.	Add after the headline of 13.2: General: Safety distances shall comply with Clauses 13.2.1 and 13.2.2 or national or regional regulations.	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
SE	13.2	Table 1	te	See appendix further below. Rows 1 and 2, column L1 and L2 are based on experience. Rows 1 and 2, column L3, L4 and L5 are based on fire impacting storage. Row 4 column L1 and L2 are based on experience. Row 4 column L3, L4 and L5 are based on fire impacting storage. Row 5 all columns are based on fire impacting storage. Row 6 is based on experience. (The fill openings are the same regardless of storage tank size.) Row 8 all columns are based on fire impacting storage. Row 9 is based on classification of hazardous areas only. Row 13 is based on fire impacting storage. Rows 14 and 15 are based on impact from electromagnetic fields causing induction. The values should be measured to the edge of the classified area.		
SE	13.2	Table 2	te	See appendix further below. Rows 1 and 2, column 1 are based on experience. Rows 1 and 2, column 2 and 4 are based on fire impacting storage. Row 5 and 6 are based on fire impacting storage. Row 7 is based on experience. (The fill openings are the same regardless of storage tank size.) Row 9 all columns are based on fire impacting storage. Row 10 is based on classification of hazardous areas only. Row 14 is based on fire impacting storage. Rows 15 and 16 are based on impact from electromagnetic fields causing induction. The values should be measured to the edge of the classified area.		

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
UK	13.2	Table 1, Table 2, Table 3, Table 5	te	The safety distances in the DTS seem to have been determined by surveying several other documents (NFPA 55, NFPA 52, etc.). It is unclear that analysis was performed to validate the distances selected. If it was, it has not been provided in sufficient detail to facilitate proposals to NFPA and others to harmonise the numbers. Using these distances will cause this specification to be in conflict with many other standards, codes and regulations. Additionally, a great deal of work is being performed to more scientifically determine these safety distances. NFPA 2 (and other codes) will be adopting these distances when the reports are published. This will lead to conflicting requirements between published codes and standards and the TS.	Provide detailed annex that includes data and rationale for the distances used in the DTS. Add language to allow distances cited in national codes, standards and regulations to be used.	
US	13.2	all	TE	The work to consider pressure as well as volume and to create charts and tables that consider hazards from both is commendable. However, the safety distances that populate these tables were determined by surveying other standards (NFPA 55, etc.) and selecting the SHORTEST distance for each situation. No analysis was performed. A safety specification or standard should err on the side of caution and use the distance that provides the most safety not the most convenience. Using the shortest distances will also cause this specification to be in conflict with many other standards. Additionally, a great deal of work is being performed to more scientifically determine these safety distances. NFPA 2 (and likely other standards) will be adopting these distances when the reports are published. This will lead to further dis-harmonization unless results from these activities are considered.	Take a big step back! Develop and document the methodology for risk-informed separation distances so that this document can serve as a basis and technical resource for global harmonization: • Create a new informative appendix that describes the risk-based approach for defining separation distances. • Interact with U.S. bodies developing separation distances based on analyses by Sandia National Labs (and others) and define harmonized risk-informed distances.	

1	2	(3)	4	5	(6)	(7)
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DE	13.2 Safety distances	Tables	ge	The number of parameters that influence the required safety distance is large. This inhibits the inclusion of a simple table of numbers and figures. As long as technical standards for the HRS do not exist, a situation specific evaluation will be required, probably in each case of a planned erection of an HRS.	Delete all tables of safety distances for liquid and gaseous installations, show instead references to codes defining how to calculate appropriate safety distances (e.g. IGC Doc 75/07/E Determination of safety distances)	
FR	13.2.		te	Need to add an introduction : - Safety distances are means of risk mitigation - Should be determined following a risk based approach : considering potential frequency and consequences of feared event. Refer to EIGA IGC/75/07 - Such an approach leads to defining safety distances where this is the most appropriate for providing risk mitigation . - The safety distances indicated hereafter can be adopted for achieving the appropriate level of risk mitigation that is to be expected from safety distances through the above approach as it applies to a gaseous hydrogen fuelling station, based on currently applied technology - There validity rests on the use of state of the art technology and good practice, as well as compliance with the other provisions of this TS - A specific analysis for the case considered may allow to justify smaller distances. Particular designs or site configuration may require increasing these distances.	Insert introduction	
CA	13.2.1		te	30 kg is too small an amount. The amount is not enough to supply fast fill for even 1 vehicle. The amount of hydrogen is not large enough to warrant such increases in safety distance.	increase the amount to 100 kg	
AT	13.2.2.1	Figure 3	ed		for easier reading • add y-labels at P=5 MPa and P=45 MPa • add line labeled "storage mass 30 kg"	

1	2	(3)	4	5	(6)	(7)
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CA	13.2.2.1		te	do not understand the significance of 1000 l versus 10000. 30 kg of hydrogen in a 10,000 l tank relates to a pressure of approximately 35 bar. This pressure would not be very useful in a filling station	eliminate the specification for water volume and only specify amount of hydrogen in kgs.	
NO	13.2.2.1	2nd paragr.	ed	Metal hydride is not part of the storage scope	Delete the paragraph	
US	13.2.2.1: Safety distances	Para		As it is currently written, the formula and exclusion is of no value. with the assumption that ND = outside diameter, 16 MPa service would be limited to 0.12 OD, 70 Mpa service would be limited to 0.027 OD. This is totally impractical. **PS x ND^2< 100 (Factor)** **factor** / **MPa** / **OD (mm)** / **OD (inch)** 98 / 16 / 3.0 / 0.120 95 / 25 / 1.9 / 0.075 98 / 35 / 1.4 / 0.055 96 / 70 / 0.7 / 0.027 If the inner diameter of the piping is considered the small piping used for fueling stations is shown in the table below with the proposed formula **PS X ID < 250** **factor** / **MPa** / **ID (mm)** / **ID (inch)** / **Wall (inch)** / **OD (inch)** 249 / 15 / 16.592 / 0.68 / 0.035 / 0.750 246 / 25 / 9.8576 / 0.404 / 0.048 / 0.500 209 / 35 / 5.978 / 0.245 / 0.065 / 0.375 231 / 70 / 3.294 / 0.135 / 0.120 / 0.375	For gaseous hydrogen storage systems of more than 1000 l, safety distances shall be counted from all the components of the storage system containing hydrogen up to the first automatic or remotely operated isolation safety device. Piping satisfying ~~**PS x ND^2< 100**~~ PS X ID < 250 where PS is the service pressure in MPa, and ~~ND~~ the ~~nominal~~ internal diameter in mm, may be excluded.	
US	13.2.2.1: Safety distances from gaseous hydrogen	Figure 3:	TE	Pressure and volume storage requirements need to be reviewed to ensure appropriate limits are established. All storage systems that can contain less than 0.98 kg at	Fix Figure 3.	

1	2	(3)	4	5	(6)	(7)
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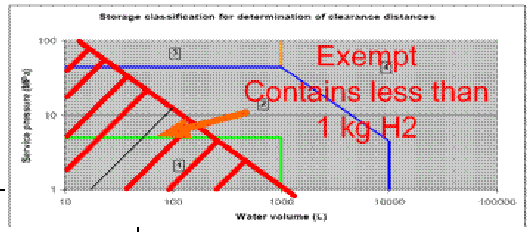
	storage systems			rated pressure and 15 degrees C must be exempt from consideration in this document as these are typically transportable vessels refilled off site. For example, NFPA 55 exempts (This chapter shall not apply to) individual systems using containers having a total hydrogen content of less than 11 m3 (400scf) if each system is separated by a distance not less than 1.5 m (5 ft)		
SE	14.4	3rd para	te		Change ”active ventilation;” to ”active ventilation (with failsafe operation);”	
SE	14.4	3rd para, 2nd indent	te	A flammable gas detector is not failsafe, i.e. it can not tell weather it is working or not at any given time. Furthermore,	Remove “a flammable gas detection system”.	

Hydrogen at MPa (and 15 deg C)	g/l	exempt qty (grams)	exempt volume (liters)	
1	0.92	988.8	1074.2	
5	4.16	988.8	237.7	
10	7.98	988.8	123.9	
50	31.22	988.8	31.7	
100	48.75	988.8	20.3	

Category 1 includes low pressure buffer tanks operating at <250 psig (similar to propane tanks) and 55 bar tanks commonly used for bulk hydrogen storage in Europe.

Category 2 and 3 should break at 55 or 60 MPa not as 45 MPa as shown because station designers need more than 45 MPa storage to support 35 MPa dispensing operations.

Category 4 storage currently includes large low pressure (<50 MPa) vessels with contents above 250 kg which should not be in Category 4 with 70 to 100 MPa vessels as there are much different failure modes and risks.

All storage system below about 5000 liters capacity should be exempt from consideration in this document as these are typically transportable vessels refilled off site.

1	2	(3)	4	5	(6)	(7)
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				EN 60079-10 does not supply the option to reduce classified areas through the presence of gas detector systems.	Change "Area classification determined as per Clause 14.2 and the protection requirements for equipment in classified areas as per Clause 14.3 may be adjusted taking into account the means of ventilation and the means of flammable gas detection that are present. In all cases, electrical apparatus operating in dilution volume that can exist near potential sources of release (leaks points) shall be protected in accordance with Clause 14.3." to "Area classification determined as per Clause 14.2 and the protection requirements for equipment in classified areas as per Clause 14.3 may be adjusted taking into account the means of ventilation. In all cases, electrical apparatus operating in dilution volume that can exist near potential sources of release (leaks points) shall be protected in accordance with Clause 14.3."	
NO	14.5/20.4		ed	The content of 20.4 is design requirements for the ventilation system and shall be put under 14.5.	Delete 20.4	
NO	14.6		ed	This sub clause is an operation manual issue	Delete	
AR	14.8		Te	Hydrogen detection systems should be certified in accordance with ISO 26142 Hydrogen detection apparatus, which is to be published	Add the following text within the subclause: Hydrogen detection systems should be certified in accordance with ISO 26142 Hydrogen detection apparatus, which is to be published Add the corresponding reference	
DE	14.8	3	te	ISO TC197 WG 13 is preparing an international standard (CD 26142). It defines the performance requirements and test methods of stationary hydrogen detection apparatus that is designed to measure and monitor hydrogen concentrations.	Flammable gas detectors used for safety shall comply with ISO standards for hydrogen specific detectors.	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
DE	14.8	last	TE	ISO TC197 WG 13 is preparing an international standard (CD 26142). It defines the performance requirements and test methods of stationary hydrogen detection apparatus that is designed to measure and monitor hydrogen concentrations.	Inspections, calibration tests and maintenance shall be carried out according to a regular scheme. The tests and maintenance may be executed according to ISO standards on hydrogen specific detectors.	
JP	14.8 Hydrogen detection systems	5th & 7th para.	te	(Original) "Flammable gas detectors used for safety shall comply with IEC60079-29-1 and ….." "The design of the flammable gas detector control circuits shall be in accordance with IEC610069-7.." (Comments) ・ IEC60079-29-1 and IEC610069-7 should be replaced with ISO 26142 once ISO/DIS 26142(Hydrogen detection apparatus) becomes an IS by ISO/TC197 WG13. ・ Same for Normative references.	・ In the sentence of "Flammable gas detectors used for safety shall comply with IEC60079-29-1 and …"The design of the flammable gas detector control circuits shall be in accordance with IEC610069-7.," ・ Replace;IEC60079-29-1 and IEC610069-7 with ISO 26142 as soon as ISO/TC197 WG13's ISO/DIS 26142(Hydrogen detection apparatus) become a standard. ・ Same for Normative references.	
FR	15	Title	Te	The title refers only to 'Gaseous hydrogen storage siting requirements' but whole Clause is written as applicable to also liquid hydrogen storage. To my present knowledge, there are no underground gaseous hydrogen storage systems but several existing liquid hydrogen storage systems?	Reword Clause title to: Hydrogen storage siting requirements (delete word 'Gaseous')	
FR	15		Te	Other options to below ground LH2 storage must be mentioned; there is no mention of direct buried LH2 storage tanks?	The TS must include reference to the fact that direct buried LH2 storage tanks exist for vehicle refuelling stations e.g. Shell Washington hydrogen refuelling station.	
DE	15 Gaseous hydrogen storage siting requirements		ge	Underground storage tanks for LH2 are not in the scope of this document so far.	We propose to create a separate chapter for below ground installation	
US	15. Hydrogen storage siting requirements		TE	Other options to below ground LH2 storage must be mentioned; there is no mention of direct buried LH2 storage tanks?	The TS must include reference to the fact that direct buried LH2 storage tanks exist for vehicle refuelling stations e.g. Shell Washington hydrogen refuelling station.	

1	2	(3)	4	5	(6)	(7)
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IN	15.1		te	Hydrogen storage areas should be equipped with fire extinguishers.	-	
SE	15.1	3rd para	te	Reason for comment is that it is not just the storage tank that is affected by a vehicular impact, but all equipment (e.g. piping) attached to it. It is also difficult to prove that a storage tank is enough resistant to damage from impact from any kind of vehicle.	Change "Gaseous hydrogen buffer storage tanks shall be resistant to damage from vehicular impact, or be protected from vehicular impact." to "Gaseous hydrogen buffer storage tanks shall be protected from vehicular impact."	
DE	15.2 Below ground vaults		ge	A chapter with the description of buried / dug storage tanks is missing and should be added		
FR	15.2.1	1st sentence	Te	Reference to existence of below ground vaults storing liquid hydrogen must be included.	Reword 1st sentence to read: 'Below-ground vaults for gaseous and liquid hydrogen storage constructed on-site shall be permitted …'.	
US	15.2.1 General	1st sentence	TE	Reference to existence of below ground vaults storing liquid hydrogen must be included.	Reword 1st sentence to read: 'Below-ground vaults for gaseous and liquid hydrogen storage constructed on-site shall be permitted …'.	
FR	15.2.2		te	2nd sentence : Conflict with section title (below ground vaults)	Delete : "The top of grade or below grade"	
FR	15.2.2		te	3rd sentence : No experience with this configuration. One sentence not sufficient to address this configuration comprehensively	Delete 3rd sentence	
DE	15.2.3 Location of accessories		te	Manually operated valves, controls, pressure relief devices, and instrumentation shall be located above ground and accessible to authorized personnel only. This is unnecessarily restrictive. There might be reasons to position those devices below ground level in an accessible area		
NO	15.2.3/ 15.2.4/ 15.2.5		ed	These three sub clauses can all be placed under 15.2.2.		

1	2	(3)	4	5	(6)	(7)
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FR	15.2.5	Title of clause	Ed	Arrangement (of what?)	Reword title of clause to: 'Storage layout arrangement'.	
US	15.2.5: Arrangement	Title of clause	ED	Arrangement (of what?)	Reword title of clause to: 'Storage layout arrangement'.	
NO	15.2.6		ed	Do not make a sub clause for one single sentence		
NO	15.2.7		ed	Do not make a sub clause for one single sentence		
DE	15.2.8 Access way		te	This is unnecessarily restrictive. There might be reasons for deviation from the mentioned numbers due to special design of the arrangement		
SE	15.4		te	The possible consequences of a fire in the building below a hydrogen storage tank are unacceptable.	Remove all instances of gaseous hydrogen buffer storage tanks.	
UK	15.4	15.4.2	te	Allowing equipment, storage, piping, etc. only on horizontal roofs of single story buildings is unnecessarily restrictive.	Remove restriction.	
CA	15.4.2		te	Metal roofing in a near horizontal configuration is also considered a hazard as it can be extremely slippery with rain ,dust or ice	Suggest adding: "Equipment to be located on this type of roof should have walkways and working platforms."	
US	15.4.2	1	TE	Allowing equipment, storage, piping, etc. only on horizontal roofs of single story buildings is unnecessarily restrictive. In fact the natural buoyancy of hydrogen may make the highest possible location preferred some installations. And, supports could easily accommodate equipment (especially storage) on a pitched roof. If some national codes limit installations to single story roofs as implied by the text, that is fine for those nations. It is not necessarily a good reason for inclusion in an international TS or IS.	Change 1st paragraph to: Hydrogen generators, hydrogen dispenser, gaseous hydrogen buffer storage tanks, hydrogen piping systems and their related accessories shall ~~only~~ be allowed to be located on ~~horizontal single story~~ building roofs ~~as instructed by national building code~~.	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
US	15.4.2	Para 1	TE	Hydrogen generators, hydrogen dispenser, gaseous hydrogen buffer storage tanks, hydrogen piping systems and their related accessories shall only be allowed to be located on horizontal single story building roofs as instructed by national building code. Is the roof of a repair garage that is 20 feet above grade – Car + lift to 7 feet + overhead roll up door – a single story building? What is the true requirement?	Clarify.	
NO	15.4.5		te	Placing control panels on the roof is not to be recommended, even if it controls equipment on the roof.	The control panels covering all processes and equipment shall be placed centrally on one area on the ground, close to other service facilities that need surveillance.	
AR	15.4.7		Te	"Combustible roof surfaces shall be protected from potential flame impingement …" Use of combustible roof surfaces should be avoided	Combustible roof surfaces should not be permitted.	
SE	15.4.7	1st para, 1st and 2nd indents	te	The possible consequences of a fire in the building below a hydrogen storage tank are unacceptable.	Change "Gaseous hydrogen equipment and buffer storage tank on a roof of an occupied building shall meet at least one of the following requirements: - The supporting roof structure and columns below the hydrogen equipment and storage footprint area shall have a one-hour fire-resistant rating but not less than that required by the type of construction for the building, or, -The ceiling area below the hydrogen equipment and storage footprint shall be fitted with fire detection devices that activate at 110 ℃ and cause opening of the emergency device to discharge hydrogen storage from all tanks as per Clause 20.4. The spacing of the fire detection devices shall meet the requirements of the national building code." to	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
					"Gaseous hydrogen equipment and buffer storage tank on a roof of an occupied building shall meet the following requirement: - The supporting roof structure and columns below the hydrogen equipment and storage footprint area shall have a one-hour fire-resistant rating but not less than that required by the type of construction for the building."	
SE	15.4.9	Title	ed		Change the title "Markings" to "Signs".	
SE	15.4.9	2nd para	ed		Remove: "The signs shall be in black letters having a minimal height of 50 mm on a white or contrasted background." Add: "The design of the signs shall comply with national regulations."	
US	15.4.9	Para 2	GE	The signs shall be in black letters having a minimal height of 50 mm on a white or contrasted background.	Refer to ISO labelling requirement standard.	
UK	16	16.1.2	te	Section 16 refers to General Equipment Requirements but there appears to be no references to quality standards for pipe work fabrication.	Add references for quality standards for pipe work fabrication.	
US	16		TE	Chapter on Liquid Hydrogen valves missing, in ref. To LH2 storage tanks	Recommend adding charter on liquid hydrogen valves	
US	16		TE	Chapter on Liquid Hydrogen piping missing, in ref. To LH2 storage tanks	Recommend adding charter on liquid hydrogen piping	

Comments that will be addressed by ISO/TC 197 WG 11 in the preparation of the international standard	Date:2008-02-25	ISO/TC 197 **N 393 Annex 2**
		Reference document: ISO/TC 197 N 375

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
US	16.1.1		TE	The first para. Should be qualified to apply only when an electrolyte is expected to be present. Galvanic corrosion could not be a problem is an indoor gas hydrogen application, for example.	Change to read: When an electrolyte is expected to be present, the use of dissimilar metals in tubing, fittings and other components should be avoided. Care shall be taken to prevent contact between dissimilar metals to prevent electrolytic corrosion. Special consideration shall be given to prevent contact between components of lower noble metals with higher noble ones. Metal fittings shall be compatible with metal tubing materials.	
US	16.1.1	Para 1	TE	The use of dissimilar metals in tubing, fittings and other components should be avoided. Care shall be taken to prevent contact between dissimilar metals to prevent electrolytic corrosion. Special consideration shall be given to prevent contact between components of lower noble metals with higher noble ones. Metal fittings shall be compatible with metal tubing materials.	The use of dissimilar metals in tubing, fittings and other components should be avoided. Care shall be taken to prevent contact between dissimilar metals to prevent galvanic corrosion. Special consideration shall be given to prevent contact between components of anodic metals with cathodic ones. Metal fittings shall be compatible with metal tubing materials.	
US	16.1.1		TE	How are dielectrics and ESD plastics to be addressed?		
AR	16.1.3		Te	Material compatibility in cryogenic service is given in ISO/TR 15916	Add the following text after the first paragraph: A guide for material compatibility in cryogenic service is given in ISO/TR 15916	
US	16.2	Para 3	TE	Where it is necessary to run gaseous hydrogen piping in the same duct or trench used for electrical cables, all joints in the hydrogen piping in the ducted/trenched section shall be welded. The hydrogen piping shall be run at a higher elevation than other piping.	Where it is necessary to run gaseous hydrogen piping in the same duct or trench used for electrical cables, all joints in the hydrogen piping in the ducted/trenched section shall be welded. The hydrogen piping shall be run at a higher elevation than other cables and/or conduits.	
US	16.2	Para 4	GE	Text worries about copper and copper alloys. Why no mention of stainless and halides?	Delete.	

1	2	(3)	4	5	(6)	(7)
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FR	16.4		te	Last sentence not clear	Replace : “unless their use results……normal operation.” By “if these do not generate electrostatic discharges ”	
FR	16.5	Last par.	te	Last par. superfluous	Delete last par. “for protect…..”	
FR	16.6		te	Add requirement of means to relieve pressure and purge with N2	Add a new paragraph : Means to safely relieve pressure and purge with an inert gas shall be provided.	
US	16.6		TE	If note 2 is correct, then it is not possible to comply with the material requirements for a copper alloy valve.	Change to read: Steel valve materials shall comply with EN 1503-2.	
AT	17	last paragraph	te	The natural buoyancy of hydrogen may be amplified (e.g. by warming the hydrogen gas)	" … devices that decrease the natural buoyancy of hydrogen …"	
CA	17		te	“ the vent piping shall be sized so that the vent line pressure will not reduce the relieving capacity of the pressure relief devices”	Suggest adding: “…or allow an unacceptable pressure build-up in the protected piping system “	
FR	17	1st par.	te	Not clear and misleading : minimizing pressure loss may lead to excessive vent line diameter, which is also a problem.	Delete first par. And replace with : Flows from vents and safety relief devices shall be piped outdoors to a safe location, so as to never generate a hazard (exposure to impingement, thermal radiation, or explosive atmosphere) for personnel or neighboring structures, i.e. in an unconfined location, away from personnel areas, electrical lines and other ignition sources, air intakes, building openings and overhangs.	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
FR	17	2nd par.	te	Propose being more specific	Delete and replace with : Hydrogen vent sources of different pressure shall not be interconnected, unless the maximum simultaneous flow from all vents will not generate a back pressure greater than 10% of the lowest set pressure of all the relief valves discharging in the common line.	
FR	17	3rd par.	te	Not clear	Delete	
FR	17	4th par.	te	Too strict with regards to manifolding of vent line + content replaced by change proposal for 1st par	Delete	
SE	17	1st para	te	This arrangement gives a good ventilation flow through the room.	Add the following: “Vent inlets and outlets shall be positioned near the floor and ceiling, diagonally across the room.”	
FR	18		Ge	This requires review : content does not provide clear requirements	Rewrite, taking into account coverage of this topic in other TC 197 standards (e.g.22734)	
IN	18.1		te	Emergency fuel cut-off should be provided in case of fire or any other hazards.	-	
US	18.4	Para 1	TE	Compressed air is not the only possibility for pneumatic power	Instrument air shall be supplied through control valves from an air compressor, nitrogen supply or other pneumatic supply system.	
NO	18.7		ed	Sub clause 18.7 contain design requirement details regarding gaseous hydrogen from liquid source. Either the whole text of 18.7 shall be transferred to 5.3, or part of the text (safety relevant issues) shall be placed somewhere else under control design issues.	Delete 18.7	
DE	20		TE	In 20. 1 the following 5 safety systems shall be provided as applicable to respond to hazardous situations resulting from an accidental release of hydrogen; but only 4 are explained in the following subclauses 20.2-20.5.	Add general requirements on hydrogen detectors.	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
AT	20.1		te		In case of hydrogen detection the following procedures shall be invoked automatically depending on the hydrogen concentration: • at 20 % of lower flammability limit (LFL): Warning of persons nearby activation of means to lower hydrogen concentration (e.g. active ventilation as described in Clause 14.4) • at 40 % of lower flammability limit (LFL): Alarming of persons nearby; shut off hydrogen supply and shut down all electrical applications (as described in Clause 18.7)	
NO	20.1	2nd paragr.	ed	Hydrogen detection does not belong to “Emergency principles and operations”. It is a gas detection device, and belongs under 7.6 “Control and monitoring”.		
US	20.2		TE	UV sensor might be set off by arcing - welding strikes, train, trolley electrical pickups and pantographs.	Add a caution.	
SE	20.4	1st para	te	Storage tanks should always be equipped with emergency release valves to prevent a possible tank rupture in case of fire near the tanks.	Change “If gaseous hydrogen buffer storage tanks may be exposed to fire conditions that could lead to rupture, thermally activated or manually activated valves may be provided to safely vent all the content of the hydrogen buffer storage.” To “Gaseous hydrogen buffer storage tanks shall be equipped with thermally activated emergency release valves to prevent tank rupture in case of fire. The valves shall be dimensioned to safely vent all the content of the hydrogen buffer storage.”	
NO	21		ed	The title “Protection from external effects” is a misleading title.	“Risk reduction assessments” will be more suitable for the contents of the text here.	
IN	21.3		te	Operators should be given adequate protection while operating equipment under hazardous conditions.	-	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted
CA	22.1	5th paragraph	te	Sub-system tie in points can have welded type connections. These must be tested as per national codes.	"Permanent connections of such sub-systems do not need to be tested if they are ..." to be replaced by "Permanent connections of such sub-systems, *if the tie-in points are not of the welded type connection,,* do not need to be *pressure* tested if they are ..."	
US	22.1	Para 2	TE	Where a pneumatic test is specified, a mixture composed of a volume fraction of 95 % nitrogen and a minimum volume fraction of 5 % helium shall be used. The pressure in the system shall be increased gradually up to the test pressure. Any defects found during the test shall be rectified in an approved manner. Where did this come from? Is this a valid fluid? Will He set off an H2 detector?		
US	22.2	Para 3	TE	Equipment made for liquid hydrogen (or any other hydrogen service) should never be leak tested by water during the installation or maintenance of a fueling station	~~Equipment made for liquids may be leak tested by water, and eventually afterwards by the liquids meant for it.~~ (Delete)	
UK	New Annex		ge	The requirements give in the TS and understanding arising from it would be significantly enhanced by the inclusion of diagram's such as: * Layout sketches illustrating minimum safety distances as given in the tables. * Flammable hazardous area diagrams showing typical zones. * Simple flow diagram's showing typical set ups for vehicle refuelling stations and storage, equipment, features such as relief devices, emergency and manual shutoff valves and control valves. Isolation for maintenance required between the various sections of the system. * Positions of bollards and zones for emergency response.	Add diagrams.	

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted

APPENDIX

13.2 Table 1

Changes to table 1

Changes apply only to values. Blank spaces mean no changes.

	L1	L2	L3	L4	L5
Building of non-comb. material (2 hr res)		3	12	12	12
Building of combustible material			25	25	
Building wall opening					
Small flammable liquids above ground	3	6	12	12	
Flammable liquids above ground	25	25	50	50	50
F. liq. below ground- Vent and Fill openings	6	6	6		
Flammable gas storage >500 m3					
Stocks of combustible material, e.g. timber	25	25	50	50	50
Open flame	*	*	*	*	*
Air conditioning & air compressor intake					
Non fuelling related activities					
Places of public assembly					
Public sidewalks and parked vehicles	6	6	6		
Trolley, train and high voltage power line	15	15	15	15	15
Other overhead electrical wire vertical	15	15	15	15	15

1	2	(3)	4	5	(6)	(7)
MB[1]	**Clause No./ Subclause No./ Annex** (e.g. 3.1)	**Paragraph/ Figure/ Table/ Note** (e.g. Table 1)	**Type of comment**[2]	Comment (justification for change) by the MB	Proposed change by the MB	**Secretariat observations** on each comment submitted

13.2 Table 2

Changes to table 2

Changes apply only to values. Blank spaces mean no changes.

	1	**2**	**3**	**4**
Building of non-comb. material (2 hr res)		12		12
Building of combustible material	3	25		25
Wall opening not above H2 system				
Wall opening above H2 system				
Flammable liquids above ground < 4000 L	25	50	25	50
Flammable liquids above ground > 4000 L	25	50	25	50
F. liq. below ground- Vent and Fill openings	6	6	6	6
Flammable gas storage >500 m3				
Stocks of combustible material, e.g. timber	25	50	25	50
Open flame	*	*	*	*
Air conditioning & air compressor intake				
Non fuelling related activities				
Places of public assembly				
Public sidewalks and parked vehicles	6	6	6	6
Trolley, train and high voltage power line	15	15	15	15
Other overhead electrical wire vertical	15	15	15	15