Saudi Standards, Metrology and Quality Organization (SASO)

Technical Regulation of Hydrogen Vehicles

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Version 1

Note:
Only the Arabic version of this Regulation is authentic in law and is applicable where there are differences with this translation

Contents

Preamble

In line with the accession of the Kingdom of Saudi Arabia (KSA) to the World Trade Organization (WTO), as per the Decree No. 244 of the Council of Ministers, dated 21/09/1426 A.H., concerning the approval of documentation on the Kingdom's accession to the WTO, and the requirements by which the KSA shall adapt its relevant systems with the principles of WTO agreements, particularly, the Technical Barriers to Trade (TBT), which stipulates that no unnecessary technical requirements shall impede the flow of commodities among the member states, and that technical requirements and methods of conformity assessment shall not discriminate between products on the basis of origin, through the issuance of Technical Regulations that include the essential requirements and standardized business procedures.

In accordance with Article 3 (Clause-1), Statute of Saudi Standards, Metrology and Quality Organization, issued in accordance with the Council of Ministers Decree No. 216, dated 17/06/1431 A.H. (31/05/2010 A.D.), stipulating that: **"SASO shall issue Saudi standards, quality systems and guidelines and conformity assessment, compatible with international standards and guidelines, that meet the requirements of the World Trade Organization (WTO) Agreement, in addition to their compliance with Islamic Sharia and serving the interests of Saudi Arabia";**

In accordance with Article 4 (Clause-2), Statute of Saudi Standards, Metrology and Quality Organization, issued in accordance with the Council of Ministers Decree No. 216, dated 17/06/1431 A.H. (31/05/2010 A.D.), stipulating that: **"SASO shall issue regulations for conformity assessment procedures of commodities, products, and services according to approved standards";**

In accordance with Article 4 (Clause-14), Statute of Saudi Standards, Metrology and Quality Organization, issued in accordance with the Council of Ministers Decree No. 216, dated 17/06/1431 A.H. (31/05/2010 A.D.), stipulating that: **"SASO shall review the laws and control regulations related to SASO's work fields, and develop them, and propose amendments thereto in line with quality and safety requirements, and refer them to competent bodies in order to review and issue them, in accordance with applicable procedures";**

In accordance with Article 6 (Clause-1), Statue of Saudi Standards, Metrology and Quality Organization, issued in accordance with the Council of Ministers Decree No. 216, dated 17/06/1431 A.H. (31/05/2010 A.D.), stipulating that: **"Subject to Article 4 of this Statute, SASO shall be the authority in charge of matters related to standards, conformity assessment procedures, granting the quality mark, metrology and calibration. All public and private sectors shall adhere to the Saudi standards in all purchases";**

Whereas the standards of the products included in a regulation shall be a basis for the conformity of such products with the essential safety requirements included in the specified regulation. Therefore, SASO has developed this Technical Regulation.

Note: This preamble and all the annexes of this regulation shall form an integral part thereof.

Article (1): Terms and Definitions

1/1 When applying the articles of this regulation, terms and expressions hereunder – shall have the meanings indicated in front thereof, unless the context otherwise requires:
KSA: Kingdom of Saudi Arabia.

Regulatory Authorities: It is the government entity(s) with supervisory tasks according to its competence and that is responsible for the implementation or follow-up of the implementation of technical regulations, whether in customs ports, markets or factories.

SASO: The Saudi Organization for Standardization, Metrology and Quality.

The Board: SASO's Board of Directors.

Technical Regulation: A document approved by the Board that specifies the characteristics of products, associated processes and production methods, including the valid applicable administrative provisions; with which compliance is mandatory. It may include or pay attention to terms, definitions, packaging, and requirements of markings or labelling for products, services, processes or production methods.
Standard: A document approved by the Board that provides, for regular and recurring use, - non-mandatory rules, instructions, and specifications of products or processes and production methods. It may include or pay attention to terms, definitions, packaging, and requirements of markings or labelling products, services, processes or production methods.

Essential Requirements: The special requirements of the products; that may affect the safety, health, and the environment; that shall be adhered to.

Hazard(s): A potential source of damage.

Risk(s): A potential risk causing damage; associated with the severity of damage.

Supplier:

- A product manufacturer, in case that he is a resident in KSA, or the person identified as the manufacturer of the product, through linking the product to their name, or to a relevant commercial description, or any person who provides a product renewal.
- An agent, if the manufacturer is a resident outside KSA or an importer in the absence of an agent of the manufacturer.
- Any person in the supply chain, whose activities may affect the product‘s properties.

Notified Bodies Conformity assessment bodies that have been accepted by the Authority in accordance with the Regulation on the Acceptance of Conformity Assessment Bodies.

Competent Authority: The legally competent authorities in the Kingdom to issue licenses for the product, and apply the provisions of this technical regulation and the regulations related to it.

Certificate of Conformity: A certificate issued by SASO or a notified body, which ensures the conformity of a product, or any batch thereof, with the requirements of relevant standards.

Supplier Declaration of Conformity: A declaration by the supplier by which it declares that a product conforms with the requirements of the applicable legislations, without the mandatory intervention of a third party neither in the design stage, nor in the production stage of the manufacturing process. A declaration may depend on testing the product in accordance with the relevant legislation.

Placing on Market: Launching a product for the first time in the Saudi market for which the manufacturer/supplier is responsible.

Making Available on the Market: Any supply of the product for distribution, consumption or use in the KSA, in the course of a commercial activity, whether in return for payment or free of charge.

Withdrawal: Any procedure that aims to prevent placing a product in the market or in a supply chain.

Recall: Any procedure that aims to recall products made available for the end-user.

Product: Hydrogen vehicle and associated systems.

Hydrogen-powered vehicle: Any vehicle that uses Hydrogen and drives to propel the vehicle.

Propulsion System: means the fuel cell system used to propel the vehicle.

Hydrogen vehicle system components: Hydrogen container and all other parts of the Hydrogen-powered vehicle that function using Hydrogen and are in direct contact with Hydrogen or that form part of the Hydrogen system.

Hydrogen System: System of Hydrogen, Hydrogen path, control, system between components, and delivery parts equipped for Hydrogen-powered vehicles, with the exception of propulsion systems or auxiliary power units. In particular, it includes:

A) Usage monitoring and control systems.

B) Vehicle interface systems.

C) Overpressure protection systems.

D) Excess flow systems

E) Heat exchanger failure detection systems.

Maximum allowable working pressure (MAWP): means the maximum pressure to which a component is designed to be subjected to and which is the basis for determining the strength of the component under consideration.

Nominal working pressure (NWP):

- In the case of containers, the settled pressure at a uniform temperature of 288K (15 °C) for a full container.
- In the case of other components, the level of pressure at which the component operates under normal conditions.

Inner container: The part of the hydrogen container designed to use liquid hydrogen that contains the cryogenic hydrogen.

Class M: Motor vehicles with at least four wheels designed and constructed for the carriage of passengers. It includes the following categories:

- **Class M1:** Vehicles designed and constructed for the carriage of passengers and comprising no more than eight seats in addition to the driver's seat.
- **Class M2**: Vehicles designed and constructed for the carriage of passengers, comprising more than eight seats in addition to the driver's seat, and having a maximum mass not exceeding 5 tones.
- **Class M3**: Vehicles designed and constructed for the carriage of passengers, comprising more than eight
- seats in addition to the driver's seat, and having a maximum mass exceeding 5 tones..

Class N: Motor vehicles with at least four wheels designed and constructed for the carriage of goods. It includes the following categories:

- **Class N1:** Vehicles designed and constructed for the carriage of goods and having a maximum mass not exceeding 3,5 tones.
- **Class N2:** Vehicles designed and manufactured for the transport of goods with maximum masses exceeding 3.5 tons but not more than 12 tons.
- **Class N3:** Vehicles designed and constructed for the carriage of goods and having a maximum mass exceeding 12 tones.

1/2 Other terms and expressions specified in this Regulation shall have the meanings specified in the applicable laws, regulations, and decrees of SASO.

Article (2): Scope

This Technical Regulation shall apply to a vehicle that act as fuel for their movement and include the following categories:

1) Hydrogen-powered vehicle of classes M and N as defined in Article (1) Terms and Definitions.

2) Hydrogen components intended for vehicles of classes M and N and listed in Annex No. (2) of this Regulation.

3) Hydrogen systems for motor vehicles of classes M and N, including new forms of storage or use of Hydrogen.

This regulation also specifies the requirements for the type approval on the Hydrogen Vehicles, their components and systems. Hydrogen-powered vehicles

Article (3): Objectives

This Technical Regulation aims to determine the basic safety requirements for Hydrogen-powered vehicles, included in the scope of this regulation, and to determine the conformity assessment procedures with which suppliers shall comply, to ensure the preservation of the environment and the health and safety of the consumers and road users.

Article (4): Obligations of Supplier

4/1 The supplier of Hydrogen vehicles must meet the following requirements:

4/1/1 Hydrogen vehicles shall be subject to the Traffic Law and its Executive Regulations in force in the Kingdom after they have met the conditions of this Technical Regulation.

4/1/2 Issue a certificate of conformity in accordance with the requirements of this Technical Regulation and the standard specifications covered therein, set out in Annex 1.

4/1/3 It shall be proved that Hydrogen-powered vehicles and all Hydrogen components and Hydrogen systems have obtained model accreditation in accordance with this Technical Regulation and carry out procedures related to their conformity.

4/1/4 Hydrogen-powered vehicles must also comply with the requirements of the Technical Regulation of Electric Vehicles.

4/2 Technical Requirements

4/2/1 General requirements for Hydrogen components and Hydrogen systems

The supplier must demonstrate the following requirements:

A) hydrogen components and systems function in a correct and safe way and reliably withstand electrical, mechanical, thermal and chemical operating conditions without leaking or visibly deforming;.

B) Hydrogen systems should be protected against overpressure.

C) The materials used for those parts of the hydrogen components and systems which are to be in direct contact with hydrogen are compatible with hydrogen.

D) Hydrogen components and systems reliably withstand expected temperatures and pressures during their expected lifetime.

E) Hydrogen components and systems reliably withstand the range of operating temperatures laid down in the implementing measures.

F) Hydrogen components are marked in accordance with the implementing measures.

G) Hydrogen components with directional flow have the flow direction clearly indicated.

H) Hydrogen components and systems are designed in such a way that they can be installed in accordance with the requirements of Annex No. (7).

4/2/2 Requirements for Hydrogen containers designed to use liquid Hydrogen

Hydrogen containers designed to use liquid hydrogen shall be tested in accordance with the test procedures described in Annex No. (3).

4/2/3 Requirements for Hydrogen components, designed for the use of liquid Hydrogen

A) Testing of Hydrogen components, other than containers, designed for the use of liquid Hydrogen shall be provided in accordance with the test procedures described in Annex 4 depending on their type.

B) Decompressors shall be designed to ensure that the pressure in the inner container or other Hydrogen components does not exceed the permissible value and the values should be set in proportion to the 'maximum allowable working pressure' (MAWP) of the Hydrogen system as the heat exchangers are equipped with a safety system that detects failure.

4/2/4 Requirements for Hydrogen containers designed to use compressed (gaseous) Hydrogen

A) Hydrogen containers designed to use compressed (gaseous) Hydrogen shall be classified according to clause 1 of Annex No. (5).

B) The testing of the containers referred to in paragraph 1 shall be provided in accordance with the testing procedures provided for in Annex No. (5) based on their type.

C) A detailed description of all the characteristics of the main materials and tolerances used in the design of the container shall be provided, including the results of the tests to which the material has been subjected.

4/2/5 Requirements for Hydrogen components, designed for the use of compressed (gaseous) Hydrogen

The testing of Hydrogen components, designed for the use of compressed (gaseous) Hydrogen, must comply with the test procedures described in Annex 6 based on their type.

4/2/6 General requirements for the installation of Hydrogen components and Hydrogen systems

Hydrogen components and Hydrogen systems shall be installed in accordance with the requirements described in Annex No. (7).

4/2/7 Requirements for use

4/2/7/1 Supply nozzle

A) The vehicle supply nozzle shall be designed in such a way as to ensure that the filling pressure is compatible with the vehicle's fuel storage system.

B) A label shall be placed near the nozzle to inform the supplier/driver/vehicle owner of the type of fuel (liquefied or gaseous Hydrogen) and the appropriate pressure value.

C) Overpressure protection shall be available in the low-pressure system

D) The Hydrogen supply system located downstream of the pressure reduction valve shall be protected from excessive stress due to the possibility of pressure reduction valve failure.

4/2/7/2 Hydrogen evacuation system

- **Pressure Relief System**

  The gas discharge pipe shall be protected from the pressure relief systems of the storage system (heat-controlled decompression devices and regulators) with a lid to prevent it from being clogged with foreign objects such as sand and gravel.

- **Vehicle Exhaust System**

  Tests shall be carried out to prove that exhaust gases are non-flammable and to ensure that exhaust gases from the vehicle are not hazardous.

4/2/7/3 Protection from ignition hazards

A) Individual malfunction occurring in the direction of the main Hydrogen shut-off valve should not cause any concentration of Hydrogen in the air anywhere in the passenger compartment.

B) Protection from the presence of Hydrogen in indoor or semi-indoor air inside a vehicle containing unprotected sources of ignition is a necessary measure.

4/2/7/4 Fuel leakage

It shall be ensured that there are no leaks of Hydrogen.

4/2/7/5 Visual Alarm System

A) There should be a visual signal alarm system to alert the driver in the event of a Hydrogen leak.
B) The visual warning system should also warn the driver in case of a malfunction of the Hydrogen detection system.
C) The separation system must respond to either of the above conditions and alert the driver immediately.
D) The Hydrogen circuit interruption light should be placed in the passenger compartment in front of the driver and in a position clearly visible to the driver.
E) The alarm indicator light should be yellow if the detection system fails
F) The indicator light should be red in case of emergency closure of the valve.

4/3 Metrological requirements

International System Units (SI Units), their multiples or parts shall be used during design, manufacturing or trading.

Article (5) Data for Hydrogen Vehicles to be included in the Certificate of Conformity (Type Approval):

Explanatory data on Hydrogen Vehicles subject to this Technical Regulation shall include the following:

5/1 These data shall conform to the requirements contained in the standard specifications contained in Annex (1).

5/2 Write in the label the name of the supplier and his commercial register.

5/3 Vehicle model and model year.

5/4 Fuel type.

5/5 Country of export (country of import).

5/6 Country of origin.

5/7 The data shall be in Arabic and may be written in another language in addition to Arabic.

Article (6): Conformity Assessment Procedures

6/1 The requirements of the conformity assessment procedures contained in this Technical Regulation shall be complied with.

6/2 The supplier - responsible for placing and displaying Hydrogen vehicles on the market - shall obtain a Type Approval certificate from SASO.

6/3 A technical file containing the following shall be attached to Hydrogen-powered vehicles:

A) The supplier(s) declaration of conformity in accordance with the form attached in Annex 9.
B) Risk assessment document.
C) Certificate of origin.
D) Test reports required in the Technical Regulation.
E) List of standards applicable to the vehicle, Hydrogen-powered components and systems.
F) Handbook of explanatory data on the use of Hydrogen in the vehicle.

6/4 The supplier shall cooperate with regulatory authorities and market survey authorities, such as providing technical dossier documents, certificates of conformity, and any other documented information proving that the product complies with the requirements of this technical regulation, whenever requested.

6/5 Products subject to this Technical Regulation that have obtained the Saudi Quality Mark shall be deemed to conform to the requirements set forth in this Technical Regulation.

Article (7): Responsibilities of Regulatory Authorities

Regulatory Authorities, as a part of their competence and powers, shall carry out the following:

7/1 Verify that the products, subject to this Technical Regulation, meet the specified conformity assessment procedures and technical documents attached to the consignments, at ports and factories.

7/2 Regulators have the right to charge suppliers (manufacturers and importers) the costs of conducting additional tests (if necessary in proof of safety) and related matters.

7/3 In case of non-conformity of the product, Regulatory Authorities shall withdraw the concerned products from warehouses, and take the necessary legal actions.

Article (8): Responsibilities of Market Surveillance Authorities

The market survey authorities shall, within their area of competence and powers, do the following:

8/1 Enforce the market surveillance procedures to the products in markets and the products stored in warehouses, in order to check the safety of the product and

the extent of fulfilment of the requirements stipulated in this Technical Regulation and relevant standards.

8/2 In case of non-conformity of a product - displayed or stored - to the requirements of this Technical Regulation, Market Surveillance Authorities shall take all administrative actions including withdrawal and recall of such product. Procedures and penalties referred to in Article (10) shall be applied, after taking the necessary actions.

Article (9): Violations and Penalties

9/1 It is prohibited to manufacture, import, place, display, or even advertise products that are non-conforming to the provisions of this Technical Regulation.

9/2 Failure to meet the requirements of this Technical Regulation shall be a sufficient reason for Market Surveillance Authorities and Regulatory Authorities to consider the product as non-conforming, which may pose a risk to the health and safety of the consumer and the environment, in the following cases:

- Non-issuance or improper issuance of the certificate of conformity or the Supplier Declaration of Conformity.
- Failure to issue a certificate of conformity or supplier's acknowledgement of conformity, or to issue them incorrectly, or to contain incomplete or incorrect information.
- Unavailability or incompleteness of technical documents.
- Lack or incompleteness of explanatory data or instructions for use, or lack of product data or information related to risk assessment.

9/3 In case of a violation of the provisions of this Technical Regulation, Market Surveillance Authorities – as the case may be - shall take all necessary actions to eliminate such violations, and their effects from the market. To this end, Market Surveillance Authorities may:

A) Mandate the violating party – responsible for placing and displaying the product – to withdraw the product from the warehouses or markets in order to rectify such violations, if possible. The product may be exported or destroyed (according to the nature of the product) within the period specified by the Market Surveillance Authorities.

B) Withdraw, restrain or destroy the products, or take any other necessary action to recall such products from the markets. As the case may be, Market surveillance Authorities may announce the withdrawal of the product from markets, and the violating party shall bear all associated expenses.

C) Deal with the violating products covered in this Technical Regulation in accordance with the laws and regulations applicable by Regulatory Authorities and the Market Surveillance Authorities.

9/4 When a violation of electrical and electronic equipment and devices is detected, SASO shall take the necessary measures against such products that violate the requirements of this regulation, including the cancellation of the relevant certificate of conformity.

9/5 Without prejudice to any more severe penalty stipulated in the applicable laws, a party that violates the provisions of this Technical Regulation shall be subject to the penalties stipulated in the applicable Anti-Commercial Fraud Law or any other superseding law.

Article (10): General Provisions

10/1 Supplier shall bear full legal responsibility for the implementation of the requirements of this Technical Regulation, and shall be subject to the penalties stipulated in the Anti-Commercial Fraud laws and/or any other related laws, in case any violation of the articles thereof is proven.

10/2 This Technical Regulation shall not impede the supplier to comply with all other systems/regulations applicable in KSA of Saudi Arabia; pertaining to trading, transporting, or storing of electric vehicles in addition to the rules/regulations related to the environment, security, and safety.

10/3 Suppliers of the electric vehicles subject to the provisions of this Technical Regulation shall provide the inspectors of the Regulatory and Market Surveillance Authorities with all necessary information and facilities, when required, to carry out their assigned tasks.

10/4 Where new originated cases that cannot be treated under the provisions of this Technical Regulation, or a dispute arises as a result of the application of those provisions, such matter shall be referred to the competent committee in SASO, in order to issue a proper resolution regarding the case or dispute, while considering the public interest.

10/5 The supplier may submit a new request after elimination of the reasons of rejection for the conformity assessment procedures request, and after the necessary corrections have been made. The supplier shall be responsible for any additional expenses determined by SASO.

10/6 SASO shall examine the complaints received regarding the products having a Certificate of Conformity, and verify the validity of such complaints, and take the necessary legal actions in case of any violations.

10/7 SASO have the right to annul the Certificate of Conformity or the Registration Certificate, if the supplier violates the provisions herein, and shall take the legal actions to ensure the preservation of the rights of SASO.

10/8 If any modifications were made to the electric vehicles during the validity period of the Certificate of Conformity or the Registration Certificate (except for figure modifications), the certificate, or the Supplier Declaration of Conformity for this product shall be annulled, and a new request shall be submitted. In addition, the supplier or the authorized representative shall notify SASO as issuer of the certificate when making any modifications to the vehicle.

10/9 SASO shall, exclusively, have the right to construe the articles herein. All beneficiaries of the application of this Technical Regulation shall adhere to the interpretations issued by SASO.

Article (11): Transitional Provisions

11/1 The supplier shall take corrective actions in accordance with the provisions of this Technical Regulation within a period of no more than six months as of the date of publication in the official gazette.

11/2 Subject to the provisions of item (1) of this Article, products, not complying with the provisions specified in this Technical Regulation may be traded for a maximum period of one year as of the date of publication in the official gazette.

11/3 This Regulation, once adopted, shall supersede all the preceding regulations in the field of conformity of electric vehicles to the safety requirements prior to placement in the market and after.

Article (12): Publication

This Regulation shall be published in the Official Gazette.

Annex (1)

A) List of Standards for Hydrogen-powered vehicles

N	Standard Number	Title of the standard in Arabic	Title of the standard in English
1.	ISO/TS 20100	الهيدروجين الغازي - محطات الوقود	Gaseous Hydrogen — Fueling stations
2.	SAE J 2601	تأجيج بروتوكولات لمركبات سطح الهيدروجين الغازي الخفيف	Fueling Protocols For Light Duty Gaseous Hydrogen Surface Vehicles
3.	ISO 17268	أجهزة توصيل التزود بالوقود للمركبة الأرضية بالهيدروجين الغازي	Gaseous Hydrogen land vehicle refueling connection devices
4.	ISO 26142	جهاز كشف الهيدروجين - تطبيقات ثابتة	Hydrogen detection apparatus — Stationary applications
5.	ISO/TS 19883	سلامة أنظمة امتصاص الضغط المتأرجح لفصل الهيدروجين وتنقيته	Safety of pressure swing adsorption systems for Hydrogen separation and purification
6.	ISO 19882	الهيدروجين الغازي - أجهزة تخفيف الضغط التي يتم تنشيطها حرارياً لحاويات وقود مركبات الهيدروجين المضغوط	Gaseous Hydrogen — Thermally activated pressure relief devices for compressed Hydrogen vehicle fuel containers
7.	ISO 19881	الهيدروجين الغازي - حاويات وقود المركبات البرية	Gaseous Hydrogen — Land vehicle fuel containers
8.	ISO 17268	أجهزة توصيل التزود بالوقود للمركبة الأرضية بالهيدروجين الغازي	Gaseous Hydrogen land vehicle refueling connection devices
9.	ISO 16110-1	مولدات الهيدروجين باستخدام تقنيات معالجة الوقود - الجزء ١: السلامة	Hydrogen generators using fuel processing technologies — Part 1: Safety
10.	ISO 16110-2	مولدات الهيدروجين باستخدام تقنيات معالجة الوقود - الجزء ٢: طرق اختبار الأداء	Hydrogen generators using fuel processing technologies — Part 2: Test methods for performance
11.	ISO/TR 15916	اعتبارات أساسية لسلامة أنظمة الهيدروجين	Basic considerations for the safety of Hydrogen systems
12.	ISO 13985	الهيدروجين السائل - خزانات وقود المركبات البرية	Liquid Hydrogen — Land vehicle fuel containers
13.	ISO 13984	الهيدروجين السائل - واجهة نظام تزويد المركبات الأرضية بالوقود	Liquid Hydrogen — Land vehicle fueling system interface
14.	SASO-ISO-8820-1	مركبات الطرق الوعرة - أسلاك المصاهر - الجزء ١: تعاريف ومتطلبات اختبار عامة	Road vehicles -- Fuse-links -- Part 1: Definitions and general test requirements

15.	SASO-ISO-8820-6	مركبات الطرق الوعرة - أسلاك المصاهر - الجزء ٦: أسلاك مصاهر بمسمار مفرد	Road vehicles -- Fuse-links -- Part 6: Single-bolt fuse-links
16.	SASO 273	السيارات - أداة الوقاية الخارجية الأمامية والخلفية لسيارات الركوب (الصدامات وغيرها) وطرق اختبارها.	Motor Vehicles: front and rear exterior protection devices for passenger's cars (Bumpers etc.) and its methods of test.
17.	SASO GSO 42	السيارات - المتطلبات العامة	Motor vehicles - General requirements
18.	SASO 400	السيارات - شهادات المطابقة	Motor vehicles conformity certificates
19.	SASO 445	إطارات سيارات الركوب - الجزء الأول: المسميات والتمييز والبيانات الإيضاحية والأبعاد والأحمال وضغوط النفخ.	Passenger car tires - Part 1: Nomenclature, designation, marking, dimensions, load capacities and inflation pressure
20.	SASO 447	إطارات سيارات الركوب - الجزء الثاني : المتطلبات العامة	Passenger car tires - part 2: general requirement
21.	SASO 448	إطارات سيارات الركوب - الجزء الثالث : طرق الاختبار	Passenger car tires - part 3: methods of test
22.	SASO 525	السيارات - طرق اختبار أحزمة الأمان	Motor vehicles - Methods of testing safety belts.
23.	SASO 526	السيارات - أحزمة الأمان	Motor vehicles - safety belts
24.	SASO 449	السيارات - قابلية الأجزاء الداخلية للاشتعال وطرق اختبارها.	Motor vehicles-flammability of interior materials and testing methods
25.	SASO 442	مركبات الطرق - المنبهات الصوتية - المواصفات الفنية	Road vehicles - Sound signaling devices - Technical specification
26.	SASO 469	السيارات – الأبعاد والأوزان	Motor Vehicles – Dimensions and weights
27.	SASO GSO 279	طرق اختبار فرش السيارات – قماش تنجيد مقاعد السيارة	Car Upholstery – Testing Methods of Fabric for Car Seats
28.	SASO GSO 280	فرش السيارات – قماش تنجيد مقاعد السيارة	Car Upholstery – Fabric for Car Seats
29.	SASO 572	مركبات الطرق – لوحات الأرقام ذات الخلفية العاكسة وطرق اختبارها	Road vehicles retro - reflective number plates and its methods of test
30.	SASO 573	كتيب إرشادات الأجهزة والمعدات	Instruction Manual for Appliances and Equipment
31.	SASO 768	السيارات - طرق اختبار أقفال الأبواب ومفصلاتها	Motor vehicles - methods of test for door locks and door hinges
32.	SASO 769	السيارات - أقفال الأبواب ومفصلاتها	Motor vehicles - door locks and door hinges
33.	SASO 770	السيارات - طرق اختبار مرايا الرؤية الخلفية	Motor vehicles - Methods of testing of rear view mirrors.

34.	SASO 771	السيارات - مرايا الرؤية الخلفية.	Motor Vehicles: Rear-view mirrors
35.	SASO 1066	اشتراطات تخزين إطارات السيارات	Requirements for storage of motor vehicle tires
36.	SASO 1134	إطارات السيارات متعددة الأغراض والشاحنات والحافلات والمقطورات - الجزء الأول: المسميات والتمييز والبيانات الإيضاحية والأبعاد والأحمال وضغوط النفخ.	Multi-Purpose Vehicles, Trucks, Buses and Trailers Tires - Truck and Bus - Part 1: Nomenclature, Designation Marking, Dimensions, Load Capacities and Inflation Pressures
37.	SASO 1135	إطارات السيارات المتعددة الأغراض والشاحنات والحافلات والمقطورات - الجزء الثاني : طرق الاختبار.	Multi-Purpose Vehicles, Trucks, Buses and Trailers Tires - Part 2: Methods of Test
38.	SASO 1136	إطارات السيارات متعددة الأغراض والشاحنات والحافلات والمقطورات - الجزء الثالث: المتطلبات العامة	Multi-Purpose Vehicles, Trucks, Buses and Trailers Tires - Part 3: General Requirements
39.	GSO 1052	إطارات السيارات - العجلات والإطارات الاحتياطية المؤقتة وطرق اختبارها.	Motor vehicles tiers - temporary use spare wheels /tiers and there methods test
40.	SASO 1771	إطارات السيارات - العجلات والإطارات الاحتياطية المؤقتة وطرق اختبارها.	Motor vehicles tires - temporary use spare wheels /tires and there methods test
41.	SASO 1437	السيارات ـ الحماية من السرقة	Motor Vehicles - Protection against theft
42.	SASO 1490	أنوار المصابيح الأمامية للسيارات - متطلبات الأمان.	Motor Vehicle - Head Lamps Safety Requirements.
43.	SASO 1315	السيارات - مساند الرأس وطرق اختبارها.	Motor Vehicles - Head restraints and method of testing.
44.	SASO GSO 1677	السيارات - زجاج الأمان متعدد الطبقات	Motor vehicles – laminated safety glass
45.	SASO 2209	السيارات – وسائل تثبيت الطفل	Motor vehicles – child restraint system
46.	SASO 2210	السيارات - طرق اختبار وسائل الطفل	Motor vehicles methods of testing of child restraint system
47.	SASO 1444	السيارات محددات السرعة - الجزء الأول: المتطلبات العامة ، فحص الجهاز ، شهادات المطابقة، اعتماد الطراز.	Motor vehicles – Speed limits – Part 1 : General requirements , Equipment inspection , Certification and type approval
48.	SASO 2249	السيارات – الرقم المميز للمركبة – المتطلبات	Motor Vehicle – Identification Number (Vin) Requirements
49.	SASO 2250	السيارات – الرمز العالمي لصانع المركبة	Motor Vehicles – World manufacturer identifier code

50.	SASO 2251	السيارات – الرقم المميز للمركبة – وضعة وتثبيته	Motor Vehicles – VIN-Location and attachment
51.	SASO 2252	إطارات سيارات الركوب درجة مقامة تآكل الموطئ والسحب والحرارة.	Motor Vehicles Tires – Treadwear, Traction and Temperature Resistance Grading
52.	SASO 2253	إطارات سيارات الركوب – طرق اختبار درجة مقاومة الإطار للحرارة.	Motor Vehicles Tires – Method of Testing of Tire Temperature Resistance Grading.
53.	SASO ISO 3537	السيارات - مواد زجاج الأمان - طرق الاختبارات الميكانيكية	Road vehicles - Safety glazing materials - Mechanical tests Road vehicles -
54.	SASO ISO 3538	السيارات - زجاج الأمان - طرق اختبار الخصائص البصرية	Road Vehicles - Safety Glasses - Test Methods for Optical Properties
55.	SASO GSO ISO 6311	السيارات – طرق اختبار بطانات المكابح – الجزء الأول: إجهاد القص الداخلي لمادة البطانة	Motor vehicles – methods of testing for broke lining – part 1: internal shear strength of lining material.
56.	SASO GSO ECE 13H	السيارات - نظام مكابح سيارات الركوب والسيارات متعددة الأغراض	Motor Vehicles - Braking system of Passenger Car and Multi-Purpose Vehicles
57.	SASO GSO ECE 13H-1	السيارات- طرق الاختبار لنظامِ المكابح - الجزء الأول: أداء المكابح	Motor Vehicles: Methods of Test for Braking System - Part 1: Braking Performance
58.	SASO GSO ECE 13H-2	السيارات- طرق الاختبار لنظامِ المكابح - الجزء الثاني: تعيين سعة أجهزة خزنِ الطاقة	Motor Vehicles: Methods of Test for Braking System - Part 2: Determination of Capacity of Energy Storage Devices
59.	SASO GSO ECE 13H-3	السيارات- طرق الاختبار لنظامِ المكابح - الجزء الثالث: تعيين توزيع المكابح بين محاور المركبات	Motor Vehicles: Methods of Test for Braking System - Part 3: Determination of Distribution of Braking among the Axles of Vehicles
60.	SASO GSO ECE 13H-4	السيارات- طرق الاختبار لنظامِ المكابح - الجزء الرابع: تعيين وظيفة الأنظمة ضد القفلَ	Motor Vehicles: Methods of Test for Braking System - Part 4: Determination of Function of Anti-Lock Systems
61.	SASO GSO ECE 13H-5	السيارات: طرق الاختبار لنظامِ المكابح - الجزء الخامس: تعيين أداءِ بطانةِ الكبحِ باستخدام ديناومتر القصور الذاتي	Motor Vehicles: Methods of Test for Braking System - Part 5: Determination of Performance of Brake Lining Using Inertia Dynamometer

62.	SASO GSO ECE 13H-6	السيارات: طرق الاختبار لمكابح النظام - الجزء السادس: تعيين معامل الالتصاق	Motor Vehicles: Methods of Test for Braking System - Part 6: Determination of Coefficient of Adhesion
63.	SASO ISO 3917	مركبات الطرق – مواد زجاج الأمان – طرق اختبار مقاومة الإشعاع وارتفاع درجة الحرارة والرطوبة والحريق ومحاكاة العوامل الجوية	Road vehicles - Safety glazing materials -- Test methods for resistance to radiation, high temperature, humidity, fire and simulated weathering
64.	SASO ISO 6310	السيارات – بطانات المكابح (الفرامل) – طريقة اختبار انفعال الانضغاط	road vehicle - brake linings - compressive strain test method
65.	SASO ISO 6312	مركبات الطرق – بطانات المكابح (الفرامل) – إجراء اختبار القص للمكابح القرصية و الأسطوانية	Road vehicles - Brake linings - Shear test procedure for disc brake pad and drum brake shoe assemblies
66.	SASO ISO 6313	السيارات – بطانات المكابح (الفرامل) – تأثير الحرارة على أبعاد وشكل لقم المكابح القرصية – طريقة الاختبار	Road vehicles - brake linings - effects of heat on dimensions and form of disc brake pads - test procedure
67.	SASO GSO ISO 4000-2	إطارات وجنوط سيارات الركوب – الجزء الثاني الجنوط	Passenger car tires and rims - Part 2: rims
68.	SASO GSO ISO 4209-2	إطارات وأطواق الشاحنات والحافلات (التسلسل المتري) – الجزء الثاني: الأطواق	Truck and bus tires and rims (metric series) - Part 2: Rims
69.	ISO 23273	مركبات الطرق التي تعمل بخلايا الوقود - مواصفات السلامة - الحماية من مخاطر الهيدروجين للمركبات التي تعمل بالهيدروجين المضغوط	Fuel cell road vehicles — Safety specifications — Protection against Hydrogen hazards for vehicles fueled with compressed Hydrogen
70.	ECE R 100	متطلبات السلامة الخاصة بمجموعة الطاقة الكهربائية لمركبات الطرق بما في ذلك أنظمة البطاريات القابلة لإعادة الشحن.	The safety requirements specific to the electric power train of road vehicles including rechargeable battery systems.
71.	UN/ECE134	أحكام موحدة تتعلق بالموافقة على المركبات ذات المحركات ومكوناتها فيما يتعلق بأداء سلامة المركبات التي تعمل بالوقود الهيدروجين	Uniform provisions concerning the approval of motor vehicles and the components with regard to the safety performance of Hydrogen fuelled vehicles
72.	SASO ISO 3894	السيارات – عجلات وأطواق المركبات التجارية – طرق الاختبار	Road vehicles - Wheels/rims for commercial vehicles - Test methods
73.	SASO IEC 60095-1	بطاريات الرصاص الحمضية المستخدمة لبدء الحركة – الجزء : ١	Lead-acid batteries for starters - Part : 1

74.	SASO IEC 60095-2	بطاريات الرصاص الحمضية المستخدمة لبدء الحركة – الجزء : ٢	Lead-acid batteries for starters - Part : 2
75.	SASO ISO 6469-1	مركبات الطرق الكهربائية - مواصفات السلامة - الجزء ١: نظام تخزين الطاقة القابلة لإعادة الشحن (RESS)	Electrically propelled road vehicles — Safety specifications — Part 1: Rechargeable energy storage system (RESS)
76.	SASO ISO 6469-2	مركبات الطرق الكهربائية - مواصفات السلامة - الجزء ٢: السلامة التشغيلية للمركبة	Electrically propelled road vehicles — Safety specifications— Part 2: Vehicle operational safety
77.	SASO ISO 6469-3	مركبات الطرق الكهربائية - مواصفات السلامة - الجزء ٣:حماية الأشخاص من الصدمات الكهربائية	Electrically propelled road vehicles — Safety specifications— Part 3: Protection of persons against electric shock
78.	SASO ISO 6469-4	مركبات الطرق الكهربائية - مواصفات السلامة - الجزء ٣: متطلبات السلامة الكهربائية	Electrically propelled road vehicles — Safety specifications— Part 4: Post crash electrical safety requirements
79.	SASO GSO ISO 3006	السيارات – عجلات سيارات الركوب المستخدمة على الطرق – طرق الاختبار	Road vehicles - Passenger car wheels for road use - Test methods

Note: The list of standards mentioned in this Annex is subject to review, and suppliers are responsible for ensuring that they use the latest standards.

B) List of HS codes for related product categories

Figure	Product Categories	HS Code
1	Cars intended to transport ten or more people, including the driver	8702

Note: The products and customs coding (HS Codes) found in Saber electronic platform are the updated and certified version.

Annex (2)

List of Hydrogen components

A) Components designed for the use of liquid Hydrogen:

1. Container.
2. Automatic shut-off valve.
3. check valve or non-return valve (if used as a safety device);
4. flexible fuel line (if upstream of first automatic shut-off valve or other safety devices);
5. Heat exchanger.
6. Manual or automatic valve.
7. Pressure regulator.
8. Pressure relief valve.
9. Pressure, temperature and flow sensors (if used as a safety device);
10. Connector or refueling vessel.
11. Hydrogen leak detection sensors.

B) Components designed to use compressed Hydrogen to a nominal operating pressure greater than 3.0 MPa:

1. Container.
2. Automatic shut-off valve.
3. Full container.
4. Fittings.
5. Fuel hose.
6. Heat exchanger.
7. Hydrogen filter.
8. Manual or automatic valve.
9. Non-return valve.
10. Regular.
11. Pressure relief device.
12. Pressure vent valve.
13. Connector or refueling vessel.
14. Removable storage system connection.
15. Pressure, temperature, hydrogen and flow sensors (if used as a safety device);
16. Hydrogen leak detection sensors.

Annex (3)

Test procedures for Hydrogen containers designed for the use of liquid Hydrogen

Test Type:

1. Blast Test.
2. Fire Exposure Test.
3. Maximum Filling Level Test.
4. Pressure Resistance test.
5. Insulation Test.

The test procedures that should be applied to obtain model approval for Hydrogen containers designed for the use of liquid Hydrogen include the following tests:

A) **Burst test**: Proof that the Hydrogen container is not produced before a specified high pressure level, without exceeding the explosion pressure (safety factor multiplied by PSMA). To obtain type approval, the actual explosion pressure value during the test must exceed the minimum required explosion pressure.

B) **Fire Exposure Test**: Proof that the container, with its fire protection system, will not explode when tested under the specified fire conditions.

C) **Maximum filling level test**: Proof that the system that prevents overfilling of the container is working properly and that the Hydrogen level never causes the decompression devices to open during the filling process.

D) **Compression resistance test:** Proof that the Hydrogen container carried a specific high pressure level. To do this, the container is compressed to a certain value for a specified period of time, after the test, the container must not show signs of visible permanent deformation or visible leaks.

E) **Leakage test:** Proof that the Hydrogen container does not show any sign of leakage under the specified conditions and to do so, the container is compressed according to the nominal operating pressure you must not detect any sign of leakage through cracks, pores or the like.

Annex (4)

Test procedures for Hydrogen components other than containers designed to use liquid Hydrogen

Product	Test Type										
	Pressure resistance test	External leakage test	Endurance Test	Reliability Test	Corrosion Resistance Test	Dry heat resistance test	Ozone Aging Test	Temperature Cycle Test	Pressure cycle test	Hydrogen compatibility test	Narrow-range test
Pressure relief devices	✓	✓		✓	✓			✓		✓	
Valves and check valves	✓	✓	✓		✓	✓	✓	✓		✓	✓
Heat exchangers	✓	✓			✓	✓	✓	✓		✓	
Refueling connections or receptacles	✓	✓	✓		✓	✓	✓	✓		✓	✓
Organizers	✓	✓	✓		✓	✓	✓	✓		✓	✓
Sensors	✓	✓			✓	✓	✓	✓		✓	
Fuel hoses	✓	✓			✓	✓	✓	✓	✓	✓	

Subject to the specific requirements of different Hydrogen components, the test procedures that shall be applied to obtain model approval for Hydrogen components, other than containers, designed for the use of liquid Hydrogen, include the following tests:

A) **Pressure Resistance Test:** Proof that Hydrogen components can withstand pressure greater than the pressure of the operation of the component The Hydrogen component may not show any visible sign of leakage, deformation, rupture or crack when the pressure is increased to a specified value.

B) **External Leakage Test:** Proof that Hydrogen components do not leak outwards Hydrogen components cannot show signs of pores.

C) **Endurance Test**: Proof that Hydrogen components are working continuously and reliably The test involves subjecting the Hydrogen component to a specified number of test cycles under a specific roof of temperature and pressure.

D) **Reliability Test:** Demonstrate that Hydrogen components work reliably.

E) **Corrosion Resistance Test:** Proof that Hydrogen components are resistant to corrosion. To do this, Hydrogen components come into contact with specific chemicals.

F) **Dry Heat Resistance Test:** Proof that non-metallic Hydrogen components withstand high temperatures. To prove this, the components are exposed to heated air to the maximum operating temperature.

G) **Ozone Ageing Test:** Proof that non-metallic Hydrogen components resist aging due to ozone. To prove this, the components are exposed to air with a high concentration of ozone.

H) **Temperature Cycle Test:** Demonstrate that Hydrogen components are able to withstand significant changes in temperature. Proving this, Hydrogen components undergo a temperature cycle for a specified duration from the lowest operating temperature to the highest operating temperature.

I) **Pressure Cycle Test:** Proof that Hydrogen components tolerate significant changes in pressure, to do this, Hydrogen components undergo a change in pressure from atmospheric pressure to maximum permissible working pressure (MAWP) and then return to atmospheric pressure in a short period of time.

J) **Hydrogen Compatibility Test:** Proof that Hydrogen metal components (i.e. valves, etc.) are not susceptible to Hydrogen bombardment.

- In Hydrogen components that undergo frequent charging cycles, conditions that can lead to local corrosion and the appearance and spread of corrosion cracks in the structure should be avoided.

K) **Extension Insulation Test:** Demonstrate that Hydrogen components are leak-free when installed in a Hydrogen system.

Annex (5)

Test procedures for Hydrogen containers designed for the use of compressed (gaseous) Hydrogen

1) Classification of Hydrogen containers designed for the use of compressed (gaseous) Hydrogen:

- **Type 1** seamless metal container.
- **Type 2** Shrinking wrap container with seamless metal jacket.
- **Type 3** Fully wrapped container with a welded or seamless metal jacket.
- **Type 4** container is completely wrapped with a non-metallic jacket.

Audition	**Applicable to container type**			
	1	2	3	4
Blast Test	✓	✓	✓	✓
Pressure rotation test at room temperature	✓	✓	✓	✓
Leakage Test (LBB)	✓	✓	✓	✓
Fire Exposure Test	✓	✓	✓	✓
Penetration Testing	✓	✓	✓	✓
Chemical Agent Exposure Test		✓	✓	✓
Composite Defect Tolerance Test		✓	✓	✓
Accelerated stress rupture test		✓	✓	✓
Cycling test at extreme temperatures		✓	✓	✓
Shock Test			✓	✓
Narrow test				✓
Permeability test				✓
Torque test on the head				✓
Hydrogen gas cycle test				✓

2) The test procedures to be applied to obtain model approval for Hydrogen containers designed to use compressed (gaseous) Hydrogen include the following tests:

A) **Burst Test:** To determine the value of the pressure at which the container explodes to do this, the container shall be compressed to a certain value, which shall be greater than the nominal working pressure of the container and the explosion pressure of the container must exceed the specified pressure. The explosion pressure of the container shall be recorded and maintained by the manufacturer throughout the useful life of the container.

B) **Pressure Rotation Test at Ambient Temperature:** Proof that the Hydrogen container tolerates significant changes in pressure to prove this, pressure cycles should be applied to the container until a failure occurs or even reach a specified number of cycles by increasing the pressure and lowering it to a specific value and the containers should not give way until they reach a specified number of cycles. The number of failure cycles shall be recorded, along with the location and description of the failure. The originator must retain the results throughout the useful life of the container.

C) **Leak Before Break Behavior Test:** Proof that the prick that Hydrogen leaks before rupture to prove this, pressure cycles should be applied to the container by increasing and reducing the pressure to a specific value. Tested containers must either fail to leak or exceed a specified number of test cycles without fail. The number of cycles performed until the container fails, along with the location and description of the failure, shall be recorded.

D) **Fire Exposure Test:** Proof that the container, with its fire protection system, will not explode when it is steamed under the specified fire conditions, and the container, which compresses according to its operating pressure, can allow its contents to exit only through the decompressor and cannot tear.

E) **Penetration Test:** Proof that the container does not tear when it is penetrated.

F) **Chemical Exposure Test:** Demonstrate the container can withstand exposure to specified chemical substances. In order to prove this, the container is exposed to various chemical solutions. The pressure of the container is increased to a given value and a burst test as referred to under point (a) is carried out. The container must achieve a specified burst pressure, which shall be recorded.

G) **Composite Defect Tolerance Test:** Proof that the Hydrogen container carries high pressures to prove this, specific geometric cracks are made in the container wall and a specific number of pressure cycles are applied. The container may not leak or rupture for a number of cycles, but it may be facilitated by during the remaining test cycles, and the number of cycles until the container fails shall be recorded, as well as the location and description of the failure.

H) **Accelerated Stress Rupture Test:** the purpose of the test is to provide evidence that the hydrogen container is capable of resisting exposure to high pressure and high temperatures at the limit of the allowable operating range for an extended period of time. In order to prove this, the container is exposed for a specified time to specified pressure and temperature

conditions, and subsequently undergoes a burst test as referred to under point (a). The container must achieve a specified burst pressure.

I) **Maximum Temperature Pressure Cycle Test:** Proof that the Hydrogen container can withstand pressure changes under different temperature conditions, and to prove this, the container, devoid of any protective casing, undergoes a hydrostatic cycle test by exposing it to harsh ambient conditions before undergoing the impulse test and non-leakage test referred to in clause (a). and (k). Containers exposed to these cycles may not show signs of tearing, leakage or disintegration of the fibers. Containers cannot explode at a certain pressure.

J) **Impact Test:** The purpose of this test is to prove that the Hydrogen container remains operational after being exposed to specific mechanical influences. To prove this, the container undergoes a fall test and a set number of pressure cycles. The container must not leak or rupture for a specified number of cycles, but may fail due to leakage during the remaining test cycles.

K) **Leakage Test:** Proof that the Hydrogen container does not show any leakage under the specified conditions, and to prove this, the container should be compressed according to the nominal operating pressure and no sign of leakage can be detected through cracks, pores or similar defects.

L) **Permeability Test:** Proof that the permeability rate of a Hydrogen container does not exceed a specified value, and to do so, the container is compressed with Hydrogen gas to its nominal operating pressure and placed for a specified period of time and under specific temperature conditions in an airtight room.

M) **Torque Test for The Leader:** Proof that the Hydrogen container bears the specified torque and to prove this, torque should be applied to the container from different directions. Thereafter, the explosion test and the leak prevention test referred to in clause (a) and (k) are performed. The container B must meet the requirements for explosion and leakage testing, and shall be registered Applied torque, leaks and explosion pressure.

N) **Hydrogen Gas Cycle Test:** Proof that the Hydrogen container carries pressure changes in beer when Hydrogen gas is used, and to prove this, the container undergoes a number of pressure cycles using Hydrogen gas and the non-leakage test referred to in clause (k). Damage, including cracks in corrosion or electrostatic discharge from the container, should be inspected.

- The beech etc. must meet the requirements of the sealant test and the container shall be free of any damage, in particular corrosion cracks or electrostatic discharge.

Annex (6)

Test procedures for Hydrogen components, other than containers, designed to use compressed (gaseous) Hydrogen

Product	Audition					
	Tests on materials	Corrosion Resistance Test	Endurance Test	Pressure cycle test	Internal leakage test	External leakage test
Pressure relief devices	✓	✓	✓	✓	✓	✓
Automatic valves	✓	✓	✓	✓	✓	✓
Manual valves	✓	✓	✓	✓	✓	✓
Non-return valves	✓	✓	✓	✓	✓	✓
Pressure relief valves	✓	✓	✓	✓	✓	✓
Heat exchangers	✓	✓	✓	✓	✓	✓
Refueling connections or receptacles	✓	✓	✓	✓	✓	✓
Organizers	✓	✓	✓	✓	✓	✓
Sensors for Hydrogen systems	✓	✓	✓	✓		✓
Fuel hoses	✓	✓	✓	✓		✓
stabilizers	✓	✓	✓	✓		✓
Hydrogen filters	✓	✓	✓	✓		✓
Removable storage system connections	✓	✓	✓	✓		✓

Subject to the specific requirements of different Hydrogen components, the test procedures applied to obtain the qualitative model approval of Hydrogen components, designed for the use of compressed (gaseous) Hydrogen include the following tests:

1) Tests on materials:

   A) Hydrogen compatibility test referred to in point j) of Annex 4.
   B) Aging test: The purpose of this test is to check whether the non-metallic substance used in the Hydrogen component can resist aging. Visible cracks are not allowed on the tested samples.

C) Ozone compatibility test: The purpose of this test is to verify whether the elastic substance of the Hydrogen component is compatible with ozone exposure, no visible cracks are allowed on the tested samples.

2) The corrosion resistance test referred to in point (e) of Annex No. (4).

3) The endurance test referred to in point C) of Appendix 4.

4) Pressure cycle test indicated in point (1) of Annex (3): Hydrogen components must not show visible signs of deformation or extrusion and must meet the requirements of internal and external leakage tests.

5) Internal leakage test: The purpose of this test is to prove that the selected Hydrogen components are free of internal leakage. To do this, Hydrogen components should be compressed under different temperature conditions while noting the possibility of leaks. The Hydrogen component must remain bubble free and cannot leak inward at a greater rate than the specified one.

6) External leakage resistance test referred to in clause (b) of Annex No. (4).

Annex (7)

Requirements applicable to the installation of Hydrogen components and Hydrogen systems

1. The Hydrogen system shall be installed in a way that protects it from damage and removes it from the car's heat sources.
2. The Hydrogen container may only be removed to replace it with another Hydrogen container for refueling or maintenance. In the case of an internal combustion engine, the container cannot be trampled in the engine compartment of the car, provided that it is adequately protected against any form of corrosion.
3. Measures shall be taken to prevent errors and Hydrogen leakage during the refueling of the vehicle and to ensure that the removable Hydrogen storage system is safely removed.
4. The refueling connector or vessel must prevent any defect and shall be protected from dust and water, and must include a return blood valve or valve that has the same function if the refueling link is not installed directly on the container, the refueling hoses shall be secured with a non-return valve or valve of the same function, installed directly on or inside the container.
5. The Hydrogen container shall be installed and secured in such a way that the specified acceleration can be absorbed without damaging the safety components when the Hydrogen containers are full.
6. The canine of the Hydrogen fuel supply shall be secured by an automatic shut-off valve that has passed directly onto or inside the container, and the valve shall be closed if this requires a malfunction of the Hydrogen system or in the event of any other event causing the Hydrogen leakage from shutting down the propulsion system, the fuel supply from the container to the propulsion system shall be closed and remain closed until the system is turned on again.
7. In the event of an accident, the automatic shut-off valve installed directly on or inside the container must stop the flow of gas from the container.
8. No Hydrogen component, including protective materials that are part of that component, shall emerge from the concussion of the vehicle or this protective structure does not apply to the adequately protected Hydrogen component and there is no part of it outside of this protective structure.
9. The Hydrogen system should be installed in such a way as to protect, as far as possible, damage caused by the movement of the components of the vehicle, shocks, diastole, loading and unloading the vehicle or transporting loads.

10. The Hydrogen component cannot be placed near the exhaust of the internal combustion engine or any other source of heat, unless this component is adequately protected from heat.
11. The ventilation or heating system should be designed in the passenger compartment and in places where Hydrogen may leak or accumulate so that Hydrogen cannot be pulled into the interior of the vehicle.
12. It should be ensured as much as possible, in the event of an accident, that the decompression device and the ventilation system associated with it remain in working condition. The ventilation system of the decompressor should be adequately protected from dust and water.
13. The passenger compartment of the car shall be separated from the Hydrogen system to prevent the accumulation of Hydrogen, and must ensure that fuel leaking from the container or its accessories does not leak into the passenger compartment of the vehicle.
14. Hydrogen components through which Hydrogen can leak into the passenger compartment, luggage compartment or any other unventilated cabin shall be placed in an airtight housing or equivalent device, as specified in the execution procedure.
15. Electrically powered devices containing Hydrogen should be isolated in such a way that no current passes through the Hydrogen-containing parts, in order to avoid electrical sparks in case of rupture. The metal components of the Hydrogen system shall be electrically connected to the floor of the car.
16. Labels or other means of identification should be used to indicate to emergency services that the vehicle is powered by Hydrogen and that the user is liquid Hydrogen or compressed (gaseous) Hydrogen.

Annex (8)

Conformity Assessment Form (Type 1a) according to ISO/IEC 17067

Type Approval

1 Type Approval

Type approval is defined as one of the conformity assessment procedures, where the notified body shall review the technical design of the product and check its validation, and then acknowledge that the technical design of the product meets the requirements of the related Saudi technical regulations.

Type approval can be made via one of the following two ways:

a) Inspecting a typical sample of the full product, to be representing the expected production, (production model).

b) Evaluating the technical design conformity of the product by reviewing the technical documentation and guides (design model), in addition to inspecting a representative sample of the proposed production (prototype), for one or more of the parts that are more hazardous of the product (combining production model and design model).

2 Type Approval Procedures

2/1 Submitting an Application for Type Approval to a Notified Body

The manufacturer shall apply for type approval to a notified body of his choice; provided that the application includes the following:

a) Manufacturer's name and address.

b) A written declaration that he did not apply to any other notified body.

c) Technical documents that enable evaluating the product's conformity with the requirements of Saudi technical regulations. These documents shall include proper analysis and evaluation of risks.

d) Technical documentation shall define the requirements applicable to the product; to include - as required by the evaluation - the design, manufacturing and operation (usage) requirements of the product.

e) The technical documents shall include the following items, as a minimum:

1) General description of the product

2) Design, manufacturing drawings and horizontal projections (diagrams) for the product elements, units, divisions and subdivisions, etc.

3) Any descriptions and explanations needed to understand the drawings, diagrams, and operation (usage) of the product in question.

4) List of fully or partially applicable Saudi standards or any other relevant technical specifications approved by SASO, in addition to a description of the solutions adopted to meet the essential requirements according to

the Saudi technical regulations, in case of not applying the standards listed. In case of partial use of Saudi standards, technical documentation shall clarify the applied items.

5) Design calculations reports, operations monitoring and testing reports, etc.
6) Test reports.
7) Representative samples of the proposed production. The notified body may request additional samples if needed.
8) Evidence supporting the appropriateness of the technical solutions adopted in the design shall refer to all the documents followed, especially in case of the non-application of Saudi standards and/or the appropriate mentioned technical criteria. Supporting evidence shall include, when necessary, the results of tests performed in the laboratory at the manufacturer's discretion, or in another laboratory under his responsibility.

2/2 Tasks of the Notified Body

2/2/1 With respect to the product

Study of the technical documentation and supporting evidences (proofs) for the purpose of assessment of the technical design of the product.

2/2/2 With respect to the samples

1) Ensuring that the manufacturing of samples is in conformity with the technical documentation, in addition to identifying the designed elements in accordance with the Saudi standards, and those designed according to other specifications.
2) Performing the appropriate examinations and tests, either personally to through an agent to assure that the technical solutions adopted by the manufacturer meet the key requirements specified in standards, in case of non-application of relevant specifications.
3) Performing appropriate tests, either personally or through an agent, to make sure, in the case of non-application of the Saudi standards and/or other appropriate specifications, that the technical solutions adopted by the manufacturer meet the basic requirements of the Saudi technical regulations.
4) Defining the testing body in agreement with the manufacturer.

2/2/3 With respect to the Decisions of the Notified Body

1) The notified body shall issue an evaluation report of all actions carried out and its outputs. The notified body shall not publish the report in whole or in part without the manufacturer's approval.

2) If the type is conforming with the requirements of the Saudi technical regulations applied to the product in question, the notified body shall issue a type approval certificate for the manufacturer. It shall include the manufacturer's name and address, results of tests, terms of validity- if any-, the information necessary to determine the accredited type, and the certificate may also include related attachments.
3) The certificate, and its attachments, shall include all appropriate information needed to assess the conformity of the products manufactured in accordance with the tested type and to make the surveillance during operation.
4) If the type was found not conforming with the Saudi technical regulations requirements applied to the product in question, the notified body shall not issue a type approval certificate, and it shall inform the applicant of its decision, accompanied with a detailed justification concerning the non-issuance of type approval certificate.
5) The notified body shall keep pace with all known technical developments, whenever these developments refer to non-conformity of the accredited type with the requirements of the Saudi technical regulations, then the notified body shall determine the need to perform additional testing, and shall inform the manufacturer in this case.
6) The manufacturer shall inform the notified body- that retains the technical documentation for the issued type approval certificate- with all the changes that may affect the product conformity of the attested type; according to the requirements of the Saudi technical regulations. The manufacturer shall also inform the notified body with any changes to the terms of type approval certificate applicability, for such changes require further attesting on initial type approval certificate.
7) Each notified body shall inform SASO with type approval certificates and with any additions issued or certificates withdrawn. The notified body shall, on regular basis, or when required, provide a list of type approval certificates and with any additions refused or with certificates suspended or restricted in any way.
8) Each notified body shall inform other notified bodies of type approval certificates and any refused additions, and with additions suspended or restricted in any way. In addition, it shall be informed, when required, with type approval certificates or any issued additions.
9) When required, SASO and other notified bodies can obtain copies of type approval certificates and/or additions thereto. SASO can, when required, obtain

copies of the technical documentation and test results carried out by the notified body. The notified body shall keep a copy of the type approval certificate, its attachments, and inserted additions in addition to the technical documents, including documents attached from the manufacturer until the certificate's expiry date.

10) Manufacturer shall keep a copy of type approval certificate, its attachments, and inserted additions thereto, in addition to the technical documents. Also, the manufacturer shall make all of these available to Regulatory Bodies and market survey authorities for 10 years after the product's placement in the market.

11) The supplier can submit the application mentioned in clause (2/1/1) above, and carry out pre-mentioned on behalf of the manufacturer, provided that the manufacturer gives his consent.

Annex (9)

Supplier Declaration of Conformity

This form shall be filled in on the company's letterhead papers

1) **Supplier Details:**

Name**:**----------
Address: ----------

Contact Person:
Email:----------
Tel. No. :----------
Fax No. :----------

2) **Product Details**

- Manufacturer's Name:----------
- Country of Manufacture: ----------
- Month and Year of Manufacture:----------
- Kind/ Type of the Car: ----------
- Car Model:----------
- Details of the Saudi/Gulf Standards or other specifications:----------
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We, hereby, acknowledge that the above-mentioned product is conforming with the Saudi technical regulation/……. ( ), and the Saudi standards/----------- included therein.

Person in Charge:----------
Company Name: ----------
Signature: ---------- Official Seal
Date: --/--/----