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# Technical regulation issues concerning fuel cell technologies in the Russian Federation, countries of the Eurasian Economic Union and CIS countries<sup>☆</sup>

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## ABSTRACT

The paper deals with technical regulation issues related to the safe application of fuel cells and related hydrogen technologies while designing, manufacturing, installing, operating and utilizing fuel cell power systems. The authors provide information on corresponding national and interstate standards of the Eurasian Interstate Council for Standardization, Metrology and Certification implemented in the Russian Federation, countries of the Eurasian Economic Union and CIS countries.

Harmonization of the national and interstate regulatory technical base with ISO and IEC international standards may allow creating favorable conditions for commercializing hydrogen and fuel cell technologies in Russia as well as countries of the Eurasian Economic Union and CIS countries in the nearest future.

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## Introduction

Today, hydrogen technologies have been used more extensively in power engineering and transport as well as in a number of other fields of application [1]. Leading automakers launch mass production of hydrogen vehicles with fuel cell power systems. Moreover, fuel cell power systems are started to be used in railway locomotives and electric loaders etc., in

addition to vehicles. Fuel cells along with related hydrogen technologies may be also used extensively in autonomous power engineering, emergency power supply, air drones, submarines and other specialty and military vehicles throughout the world. In January 2017, thirteen global companies (Air Liquide S.A., Alstom, Anglo American plc, BMW Group, Daimler AG, Engie S.A., Honda Motor Co. Ltd, Hyundai Motor Company, Kawasaki Heavy Industries Ltd., Royal Dutch Shell, The Linde Group, Total S.A. and Toyota Motor

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Nomenclature			
AC	Alternating current	EAEU	The Eurasian Economic Union
Al	Aluminium	EASC	The Eurasian Interstate Council for Standardization, Metrology and Certification
Ar	Argon	EPA	The United States Environmental Protection Agency
CGH <sub>2</sub>	Compressed gaseous hydrogen	EV	Electric vehicle
CH <sub>2</sub> SH	Methyl mercaptan	FC	Fuel cell
CO	Carbon monoxide	FCV	Fuel cell vehicle
CO <sub>2</sub>	Carbon dioxide	FMEA	Failure mode and effects analysis
COS	Carbonyl sulfide	GOST	The set of technical standards maintained by EASC
CS <sub>2</sub>	Carbon disulfide	GC	Gas chromatography
DC	Direct current	IEC	The International Electrotechnical Commission
HCHO	Formaldehyde	ISO	The International Organization for Standardization
HCOOH	Formic acid	JIS	Japanese Industrial Standards
He	Helium	LPG	Liquefied petroleum gas
H <sub>2</sub> S	Hydrogen sulfide	MS	Mass spectrometry
NH <sub>3</sub>	Ammonia	NHEA	The National Hydrogen Energy Association of RF
kW	Kilowatt	PEM	Proton exchange membrane
Mg	Magnesium	RESS	Rechargeable energy storage system
mol	Mole	RF	The Russian federation
μmol	Micromole	SCAQMD	The South Coast Air Quality Management District
W	Watt	TR	Technical report
Zn	Zinc	UNECE	The United Nations Economic Commission for Europe
Acronyms		USSR	The Union of Soviet Socialist Republics
ASTM	The American Society for Testing and Materials	WEF	World Economic Forum
CIS	The Commonwealth of Independent States		
CU	The Customs Union		
CU TR	Technical Regulations of the Customs Union		
EACU	The Eurasian Customs Union		

Corporation) announced a global initiative on working out a single concept of the hydrogen technologies development and united into the Hydrogen Council at the World Economic Forum (WEF) in Davos [2]. These companies plan to invest more than \$10.7 billion in the development of hydrogen technologies over the next 5 years.

The widespread use of fuel cells in the global energy, transport and communication market has been preceded by a significant work on developing the international standards which may cover almost all aspects of activities related to the design, manufacturing and operation of such power systems being undertaken by the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC) within 25 years [3]. The paper considers corresponding national and interstate standards of the Eurasian Interstate Council for Standardization, Metrology and Certification (EASC) introduced in the Russian Federation, countries of the Eurasian Economic Union (EAEU) and CIS countries.

### Harmonization of standards in the field of fuel cells and hydrogen technologies

The legal base of standardization in Russia is established by the Federal Law No. 184-FZ of December 27, 2002 “On Technical Regulation” and by the Federal Law No. 162-FZ of June 29, 2015 “About standardization in the Russian Federation” determining,

among other things, the objective as well as goals and main areas of the international and regional cooperation in this field.

The reform of technical regulation in Russia based on the Federal Law No. 184-FZ of December 27, 2002 may provide ample opportunities to modernize the regulatory technical base of hydrogen technologies. These processes combined with harmonization of the national, interstate and international systems for standardization may allow modern Russian business taking an active part in processes related to the development of the fuel cell technologies market.

The interstate system for standardization is based on requirements of the Eurasian Interstate Council for Standardization, Metrology and Certification (EASC) represented by the regional association of national standards bodies of CIS countries including the Committee for Standardization, Metrology and Patent of Azerbaijan Republic (Azstandard); the Ministry of Economy of the Republic of Armenia; Gosstandart of the Republic of Belarus; the Technical Regulation and Metrology Committee of the Republic of Kazakhstan; the Center for Standardization and Metrology of the Kyrgyz Republic (Kyrgyzstandard); Central Metrology Authority of Moldova (Moldovastandard); Russian Federal Agency on Technical Regulating and Metrology (Rosstandart); the Agency on Standardization, Metrology, Certification and Trading Inspection under the Government of the Republic of Tajikistan (Tajikstandard); Uzbek Agency for Standardization, Metrology and Certification (Uzstandard); the Ministry of Economic Development and Trade of Ukraine. Besides, the Georgian

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