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Gas infrastructure — Consequences of hydrogen in the gas infrastructure and identification of related standardisation need in the scope of CEN/TC 234

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National foreword

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A list of organizations represented on this committee can be obtained on request to its committee manager.

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English Version

Gas infrastructure - Consequences of hydrogen in the gas infrastructure and identification of related standardisation need in the scope of CEN/TC 234

Infrastructure gazière - Consequences d'hydrogen dans l'infrastructure gazière et l'identification des besoins relatifs à la normalisation dans le domaine d'application de CEN/TC 234

Gasinfrastruktur - Auswirkungen von Wasserstoff in der Gasinfrastruktur und Identifikation des zugehörigen Normungsbedarfs im Zuständigkeitsbereich des CEN/TC 234

This Technical Report was approved by CEN on 24 January 2022. It has been drawn up by the Technical Committee CEN/TC 234.

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Ref. No. CEN/TR 17797:2022 E

Contents

Page

European foreword

This document (CEN/TR 17797:2022) has been prepared by Technical Committee CEN/TC 234 “Gas infrastructure”, the secretariat of which is held by DIN.

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Introduction

The injection of hydrogen in natural gas infrastructures demands considerations with regard to the integrity, safety and performance of the systems facing increasing hydrogen levels, its fluctuation and variation.

There is extensive research on the use of hydrogen as an admixture with natural gas in various percentages or as pure hydrogen. Impact studies already completed or in progress are focusing on the use of existing gas networks but also of dedicated gas networks for hydrogen. They also include the impact of the introduction of hydrogen in various percentages into the gas infrastructure on all the existing technologies within the gas supply chain.

Accepting hydrogen into the natural gas network requires input from many gas TCs at CEN, i.e. CEN/TC 234 and particularly from the manufacturers of essential components, e.g. valves, gas pressure regulators, gas meters, safety control devices, leak detection devices, and many more (see Annex A). Many of these manufacturers are assessing the potential impact of hydrogen on existing components in natural gas service.

Co-operation with these other CEN and ISO/TCs for various essential components and applications will be necessary to ensure that projects to introduce hydrogen have all the essential elements of the gas chain fully co-ordinated into the plan. The positive co-operation of the component manufacturers will be particularly important.

In the transition scheme to hydrogen, there is a large body of knowledge and experience available from the hydrogen industry for gas production and use. The long-established safety requirements in this sector will aid the amendment of natural gas standards and codes of practice and the development of any new standards

This report is written for

— CEN/TC 234 as basis for definition of a TC roadmap for standardisation

— CEN/TC 234 WGs as a guideline for the standardisation work

— interested parties to get an insight in the decision process of CEN/TC 234's hydrogen standardisation.

NOTE This document has been elaborated in co-operation between the Working Group convenors, secretaries and experts, TC chair and secretariat of CEN/TC 234. Respecting different working group contributions, the way in which the content is presented and the level of details differs for the different topics. This is acceptable as the real technical work will take place in the dedicated working groups with co-ordination of the TC 234 Convenors/Secretaries group to ensure the final coherence of the resulting standardisation deliverables.

1 Scope

This document is written in preparation of future standardization and provides guidance on how injection of H_2 into the gas infrastructure can impact processes from the input of gas into the on-shore transmission network up to the inlet connection of gas appliances.

NOTE 1 Gas infrastructure includes gas installation pipework between the delivery point of the gas and the inlet connection to the gas appliance in buildings and on industrial sites.

The assessments refer to the concentrations of 2, 5, 10, 20 and up to 100 Vol.- % hydrogen in natural gas.

Furthermore, it identifies the expected revision need of the existing CEN/TC 234 standards as well as the need of further new standardisation deliverables.

It examines the effects on each part of the gas infrastructure in the scope of the CEN/TC 234 Working Groups 1 to 12 inclusive, based on available studies, reports and research. Due to several limitations at different hydrogen concentrations, the impacts are specified.

For some specific impacts, pre-standardization research is needed.

By convention, for this technical report, the injection of pure hydrogen, i.e. without trace and/or minor components is considered. Awareness is given that there is the need to consider trace and/or minor components and limits set on the gas quality on European and national level, too.

The information from this report is intended to define the CEN/TC 234 work program for the coverage of H_2NG in relation to the scope of the CEN/TC 234 and its WGs.

NOTE 2 Progress on hydrogen will develop over time. In principle this will be reflected in the standardisation process in CEN/TC 234.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviations

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at http://www.iso.org/obp

The International Gas Union glossary on Underground Gas Storage [1] can be useful too:

3.1 Terms and definitions

3.1.1
hydrogen embrittlement
HE
interaction of hydrogen atoms and steel can have a negative effect on the mechanical behaviour of steel.

Note 1 to entry: The general term for this degrading effect is called hydrogen embrittlement