Project Acronym: Hydroptics

Grant Agreement number: 871529 (H2020-ICT-2019-2)

Project Full Title: Photonics sensing platform for process optimisation in the oil industry

DELIVERABLE

D2.3 – Report on regulatory & standardization activities: First

Dissemination level	PU – Public
Type of Document	Report
Contractual date of delivery	31/05/2020
Deliverable Leader	Anatol Ehrlich (QRT)
Status & version	V2.0
WP / Task responsible	WP2 / QRT
Keywords:	Standardisation, EN, CE, ASTM, ISO

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Document History			
Version	**Date**	**Contributor(s)**	**Description**
V1.0	15/05/2020	QRT	First complete version

V2.0	29/05/2020	QRT	Second complete Version. Input from DBC & OMV was incorporated.

Executive Summary

This deliverable aims at highlighting the regulatory and standardisation requirements for a future Hydroptics platform. It distinguishes between the EU-directives (regulations) that must be fulfilled regardless, and the standards that could be applied in order to comply with these regulations. Special care has been taken to cover both the regulations within the European Union as well as in Turkey as these are the two locations of the End-users where the Hydroptics platform will be deployed. The document has been set up such that the regulations are covered first. Here an extensive list of applicable regulations (including a summary of each) was prepared. Furthermore, they have been put into context by describing how they might apply to the Hydroptics platform by providing specific use-case examples. Relevant standards are also listed in this summary and explained in detail in the following chapter. Finally, a roadmap to the standardisation of the Hydroptics platform is presented by proposing a CEN/CENELEC Workshop agreement in case not all aspects of the product are standardised.

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1. Introduction

This deliverable is an initial report as part of T2.3 (Hydroptics regulatory & ISO/ASTM certification aspects). It identifies the most relevant regulatory bodies within the European Economic Area (EEA) and Turkey and links them to the latest standard and methodologies applicable to the Hydroptics platform.

The Conformité Européenne (CE) marking is identified as being mandatory for selling products within the EEA and in Turkey. It comprises a set of directives or regulations that must be met before being allowed onto the market. This report identifies a list of directives which could apply to the Hydroptics platform.

To comply with these directives, standards can be followed. While they are not mandatory, they provide guidance for companies on how best to meet the regulations set out by the EU. In particular, harmonised standards are used to demonstrate that products comply with EU legislation. A list of relevant harmonised standards for the future Hydroptics platform is provided in this deliverable.

A long-term strategy with regards to standardisation activities is presented towards the end of the report. It introduces an “Exploitation Table” used for monitoring all innovations during the project lifetime on a sub-component level. This table not only serves to capture all IPR activities but it will also be used to identify issues concerning standardisation protocols and bodies. By comparing the entries of the exploitation table to the comprehensive list of EU-directives and standardisation options outlined in the first 2 Chapters of this report, we lay the foundation for the successful handling of standardisation issues.

2. Regulatory Bodies & Requirements

This section provides an overview of the regulations and requirements for a product to be sold within the EEA or in Turkey. For Europe, the most important step is for the product to obtain the CE marking by fulfilling EU-directives. It is therefore of great importance to ensure that the Hydroptics platform prototypes already take this into consideration.

To obtain the CE marking, several EU-directives (or regulations) must be met. They are a legislative act that sets out a goal that all EU countries must achieve. However, it is up to the individual countries to devise their own laws on how to reach these goals [1]. This leaves the member states some room to decide the exact rules to be adopted. As EU-directives do not propose a specific way on how to reach these goals, standards have evolved over time providing a pathway for certain products to follow in order to achieve the goals laid out in the EU-directives.

Broadly speaking, a standard defines an approach or a procedure applicable to certain processes. They ensure conformity by providing a guideline to be followed. As such, standards exist to help companies achieve the regulatory requirements laid out by the EU. Chapter 3 deals with standards and their governing bodies in more depth.

In order to fulfil the EU-directives, several standards have evolved over time. Often submitted to different national (and international) standardisation bodies, it is difficult to keep an overview on which standards are relevant for a certain product. For this reason, harmonised EU standards issued by the 3 European Standardisation Bodies were introduced in 1961 as a guidance for products to comply with the EU legislation (in particular EU-directives, see Chapter 3.1). The advantage of EU harmonised standards is that they specifically assess the conformity to relevant EU legislature, while non-harmonised standards do not necessarily do so.

2.1. Europe - Conformité Européenne (CE)

Most products to be sold within the EEA must bear the "CE" marking that indicates conformity with health, safety, and environmental protection standards. It serves to unify standards and is regulated by EU harmonisation standards. Compliance is determined by a conformity assessment procedure. It should be noted that CE is not a quality mark, but instead it means that the product on which it was been affixed meets all the requirements of the related directives. [2]

The necessary steps to obtain a CE marking can be summarized as follows [3]:

- Define the intended use of the product
- Identify the applicable EU-directives and regulations
- Select the conformity assessment procedure that is suitable to the product
- Analysis and evaluation of the product requirements according to the EU directives and regulations
- Take necessary measures in the development and manufacturing process.
- Preparation of the technical documentation for the product
- Issue the EU declaration of conformity and affix the CE mark to the product.

Throughout the Hydroptics project lifetime, the exact nature of the prototype will show and initial steps can be taken towards CE conformity by going through the list shown above.

2.1.1. EU Directives and Regulations

An initial analysis of the Hydroptics platform concluded that the following directives and regulations could apply in order to obtain the CE marking. It also provides a short description of its content and a reference to relevant harmonised (and non-harmonised) standards:

Directive 2014/35/EU - Low Voltage Directive (LVD)

This directive is applicable to electrical devices with voltage limits between 50 V to 1000 V for alternating current and 75 V to 1500 V for direct current. The standards EN 61010 and EN 60335 address the requirements defined in this directive. The Hydroptics platform will have an input voltage of 230 V AC and a power consumption of ideally < 2000 W, and thus will fall into this directive.

Directive 2014/30/EU - Electromagnetic Compatibility (EMC)

The directive includes requirements for devices that can cause electromagnetic interference or are influenced by other devices that emit electromagnetic radiation. Since the Hydroptics platform will include various electrical components in close proximity, adequate shielding and good engineering practice will be required to fulfil this directive. The most relevant standards are EN 61326-1 and EN 55014

Directive 2006/42/EC - Machinery Directive

Machinery consists of an assembly of components, at least one of which moves, joined together for a specific application. The drive system of machinery is powered by energy other than human or animal effort. Exempt from the regulation are: specially designed machines for short term research work in laboratories. The Hydroptics platform could see two moving components in its prototypes:

1. Impeller inside the batch reactor or the Continuously Stirred Tank Reactor (CSTR), with an rpm value of up to 16 000.
2. Centrifugal separator for separating the organic and water phase. While exact rotation speeds cannot be defined at this point, one can assume that values of up to 40 000 rpm are possible.

In case this directive does apply to the Hydroptics platform the standards EN ISO 12100 and EN626-1 could be used as guidance. In case more or unforeseen moving components are added to the system, the European Commission has issued a listing of EU harmonised standards that provide an excellent overview [4].

Directive 2014/34/EU - ATEX Directive (Explosion Protection)

This directive defines a set of rules to be followed by devices that operate in an environment with an explosive atmosphere. After conferring with both OMV and TÜPRAS, there exists the scenario where the Hydroptics platform will be used in explosive environment. Therefore, this should be taken into account by following the standards EN 14986 and EN 1127.

Directive 2014/32/EU - Measuring Instruments Directive (MID)

This directive defines the requirements for measuring devices. The Hydroptics platform could fall into the category of a measuring device as an “oil meter” or a “particle counter”. At this point no relevant harmonised standards were found that cover oil meters or particle counters.

Directive 2014/68/EU - Pressure Equipment Directive (PED)

This directive applies to the design, manufacture and conformity assessment of stationary pressure equipment with a maximum allowable pressure greater than 0,5 bar. The implementation of the directive is supported by a set of PED guidelines and guidance documents [5]. The Hydroptics platform could see vessels with pressures greater than 0,5 bar for cleaning the reactor with or within the centrifugal separator. EN 13445 provides a guideline on how to design and implement high pressure vessels into the platform.

Directive 2011/65/EU - Restriction of the use of certain hazardous substances (RoHS)

The manufacturer must be able to provide documentation that proves that their products take into account the substance restrictions. This usually involves a tight collaboration with the suppliers of the individual components to back trace the supply chain. DIN EN 50581 outlines a procedure to comply with the RoHS directive.

2.2. Turkey

As Turkey is not part of the EEA, some fundamental questions had to be clarified. A survey with questions was sent to TÜPRAS and their answers taken into consideration in Chapter 2.2.1 (Regulations and Regulatory Bodies in Turkey and at TÜPEAS) and in Chapter 3.3 (Standardisation in Turkey and at TÜRPAS).

2.2.1. Regulations and Regulatory Bodies in Turkey and at TÜPRAS

Just as in the European Union, the CE marking is also mandatory for the domestic sale of products in Turkey. In particular, all electronic devices must fulfil the requirements of the EU Low Voltage Directive (LVD) and the Electromagnetic Compatibility (EMC) regulations.

Turkey also requires products to bear the CE marking as an affirmation of conformity. The process to obtain the CE marking follows the same procedure as already outlined in Chapter 2.1 [2]. In this regard, Turkey has taken over several EU-directives in April 2004 that are mentioned within the CE marking. [6]

In addition to the CE marking, TÜPRAS also requires a future Hydroptics Platform to have an ATEX certificate by complying with the Directive 2014/34/EU. Instrument standards can be followed and requested from TÜPRAS in accordance with the product usage place and purpose.

3. Standardisation

According to the European Union "Standards and other standardisation publications are voluntary guidelines providing technical specifications for products, services, and processes". Standards are developed by private standardisation organisations usually initiated by the stakeholder who see a need to apply a standard [7].

A Standard is often seen as a technical document designed to be used as a rule, guideline or definition. It is a consensus-built, repeatable way of doing something [8].Interested parties such as manufacturers, consumers and regulators come together to decide on how to achieve an objective, keeping in mind product safety, quality and costs. Through the collaboration of various different industries, standards have proven to be a great asset when it comes to implementing new processes and reaching targets.

Standardisation bodies exist to organize, develop and issue standards that are intended to address the needs of a group. Standardisation bodies can be broadly categorized into the following groups:

- National Standardisation Bodies (e.g DIN, ANSI)
- International Standardisation Bodies (e.g ISO, ASTM)
- European Standardisation Bodies (CEN, CENELEC, ETSI)

3.1. European Standards (EN)

European Standards are adopted by one of the 3 European standardisation organisations (ESOs):

- European Committee for Standardisation (CEN): is an association that brings together the National Standardization Bodies of 34 European countries. It has been officially recognized by the European Union as being responsible for developing and defining voluntary standards at European level. CEN provides a platform for the development of European standards and other technical documents to various kinds of products and processes. They also support companies in their standardisation activities. [9]
- European Committee for Electrotechnical Standardisation (CENELEC): is responsible for the standardization in the electrotechnical engineering field. It prepares voluntary standards, which helps facilitate trade between countries. CENELEC create market access primarily at European level by adopting international standards wherever possible. [10]
- European Telecommunications Standards Institute (ETSI): deals with telecommunications, broadcasting and other electronic communications networks and services. It supports the development, ratifications and testing of globally applicable standards for ICT-enabled systems. [11]

The members of CEN, CENELEC and ETSI are the National Standardisation bodies and committees in the European countries. They are required to adopt the approved standards as a national standard. In Austria, EN norms are published as "ÖNORM EN", in Switzerland as "SN EN" and in Germany as "DIN EN".

3.2. Harmonised Standards

A harmonised standard is a European standard developed by a recognised European Standards Organisation: CEN, CENELEC, or ETSI. It is created following a request from the European Commission (known as a mandate) to one of these organisations. Manufacturers, other economic operators, or conformity assessment bodies can use harmonised standards to demonstrate that products, services, or processes comply with relevant EU legislation [12].

Harmonised standards are published in the Official Journal of the European Union (OJEU) and therefore, provide "presumption of conformity". It provides access to the latest lists of references of harmonised standards.

Non-harmonised standards can be used to comply with EU-directives, but they do not automatically comply with the essential requirements of the directive [13].

A list of relevant harmonised standards is provided below. It also includes a short summary for each standard and how it may be applicable to the Hydroptics platform.

EN 13445 - Unified Pressure Vessels

EN 13445 is a standard that provides rules for the design, fabrication, and inspection of pressure vessels. It is harmonized with the Pressure Equipment Directive (PED).

EN 12100 – Machine Safety – General Principles for design, Risk assessment and risk reduction

This standard defines the basic terminology, guiding principles and a methodology for constructing safe machines. It sets out rules for risk assessment and risk reduction that are based on knowledge and experience of the design, use, incident and accident events. It also provides guidance on the documentation and evidence of the risk assessment and risk reduction process.

Considering that the Hydroptics platform will contain moving parts, this standard could be of great importance not only during the design process, but also during the risk evaluation and risk assessment of the system once a first prototype exists.

EN 626-1 – Safety of Machinery – Reduction of risks to health from hazardous substances emitted by machinery.

In conjunction to EN 12100 this standard extends machine safety to hazardous substances emitted by the machinery. Since the Hydroptics platform will be dealing with potentially hazardous substances such as anti-bio-fouling agents or solvents for cleaning the reactor or the measuring cell, this standard could provide some crucial parameters to take into account. While the machinery itself will most likely not emit hazardous substances, it is its contact with chemical that might do so. Nonetheless, the precautions in both cases should be similar if not the same.

EN 14986 - Design of fans working in potentially explosive atmospheres

This European standard describes the general requirements for the use of ventilators in explosive atmospheres. To circumvent the build-up of hazardous fumes within the Hydroptics platform and to avoid hotspots, an adequate ventilation system will be required. This will be achieved by using multiple fans placed strategically throughout the platform. The operation and requirements of these fans to be used safely within an explosive environment is described in this standard.

EN 1127 - Explosive atmospheres - Explosion prevention and protection

This document describes the procedures for the detection and assessment of dangerous situations that can lead to explosions and specifies suitable planning and manufacturing measures to achieve the required safety. The Hydroptics platform will consist of several electrical connections and motors that could lead to a spark and ignite the surrounding explosive gases. Where possible brushless motors will be favoured over brushed motors and

suitable electrical isolations will be implemented. Furthermore, adequate ventilation will reduce the risk of flammable gases within the platform. Special care will be taken for the isolation of the solvent compartments and reactor, where flammable cyclohexane could escape.

EN 61326 - Electrical equipment for measurement, control and laboratory use

This document specifies the electromagnetic compatibility (EMC) requirements and emissions for electrical devices that operate using a power supply with less than 1000 V AC or 1500 V DC. With an input voltage of 230 VAC the Hydroptics platform falls within this category. Guidelines that will be considered during the design of platform include:

- Closed metal casing
- Reasonable grounding concept
- Use of suitable material and isolation of electrical wirings.

Taking into account all these considerations during the design process should ensure the platforms compatibility with the EU-directive 2014/30/EU. Nonetheless, it is highly recommended to perform an EMC test by an independent company. In Austria the “SGS group” performs EMC tests for a wide range of products and also provides support for the implementation of the EMC regulations.

EN 55014 – Electromagnetic compatibility (EMC) requirements for household appliances, electric tools and similar apparatus.

This standard applies to the limitation of high-frequency interference (radio interference suppression) – both continuous and discontinuous interference – from household appliances, power tools and similar electrical devices. To avoid these interferences a similar approach as described in “EN 61326” will be followed. Particularly high frequency motors to power the centrifugal separator or the impeller might emit radiation with the frequency band of 9 kHz up to 400 GHz.

EN 60335 - Household and similar electrical appliances - Safety

This standard deals with the safety of electrical devices and machines for the area of the domestic environment and commercial purposes. The rated voltage may not exceed 250 V for single-phase devices and machines and 480 V for other devices and machines.

EN 60825-1 - Safety of Laser Products

This standard is to be used for the safety of laser devices operating in the wavelength range of 180 nm to 1 mm laser radiation. In the Hydroptics platform at least 3 components would be classified as a laser. Firstly, the Mid-IR Quantum Cascade Lasers from ALPES. Secondly, the frequency combs developed by IRSWEEP, and finally the Hyperspectral Imaging system by SAL. In all cases a light source between the wavelengths mentioned above will be used and must be adequately shielded from humans to avoid serious harm. This standard describes general rules on how to classify the laser radiation, determine the accessible emission levels, and how to engineer the housing to comply with EU regulations.

EN 61010-1 - Safety requirements for electrical equipment for measurement, control and laboratory use

This part of the EN 61010 specifies the general safety requirements for electrical devices and their accessories, regardless of where the use of the devices is intended. In particular it mentions devices used for industrial process control and laboratory devices for measuring substances. Considering that the Hydroptics platform could be used for process monitoring of substances and subsequent process control, this standard is certainly relevant.

3.3. Standardisation in Turkey and at TÜRPAS

The Turkish Standards Institution (TSE) is the sole authorized standardisation body in Turkey. It operates in diverse fields of quality infrastructure including certification, testing, training and performs surveillance as well as inspection activities. TSE is a member of the world standardisation community, with its full membership of International Organization for Standardization (ISO), International Electrotechnical Commission (IEC), Standards and Metrology Institute for the Islamic Countries (SMIIC), European Committee for Standardization (CEN) and European Committee for Electrotechnical Standardization (CENELEC).

TSE, as a standardization body, provides the standards aimed at enabling industrialists to produce goods and services in compliance with rules, laws, codes and standards applicable in global markets, as well as being a notified body, enabling clients to gain access into the European and Gulf market by ensuring their products meet all CE mark requirements according to European Directives/Regulations and G mark requirements according to the Gulf Cooperation Council (GCC) Standardisation Organisation (GSO) regulations.

TÜPRAS has also provided a comprehensive list of codes & standards specified in TÜPRAS TGPS standards. For devices to be used in instrument systems, different standards must be adapted depending on the applications. This list will be used as a reference document and will be available to all partners on the Hydroptics cloud platform.

3.4. ISO

ISO stands for "International Organisation for Standardisation" and denotes international standards. It is widely used to define industrial standards dealing with mechanical components. ISO standards are listed either by themselves or by including as a prefix the original European or national standard. This indicates that for example a European standard (EN) meets international requirements. Conversely, ISO standards that have been adopted as European standards are denoted as "EN ISO".

Some relevant ISO standards and their applicability to the Hydroptics platform include:

ISO 8466-1:1991 - Calibration and evaluation of analytical methods and estimation of performance characteristics

Water quality – calibration and evaluation of analytical processes and evaluation of process parameters. Part 1: Statistical evaluation of the linear calibration function. This part of the ISO describes the steps taken in evaluating the statistical characteristics of the linear calibration function. It is applicable to methods requiring a calibration. Furthermore, it covers the determination of the Limit of Detection (LOD) and Limit of determination, the effect of interferences and other performance characteristics. During the AQUARIUS project this ISO standard was successfully applied to characterize the online oil in water analyser.

ISO 8466-2:2001

Water quality — Calibration and evaluation of analytical methods and estimation of performance characteristics — Part 2: Calibration strategy for non-linear second-order calibration functions. This is the continuation of the previous standard mentioned above. It covers a calibration strategy with a non-linear response. This calibration strategy might be relevant for the hyperspectral imaging system.

ISO 5667-3:1994 - Water quality Sampling

This document specifies general requirements for the sampling, preservation, handling, transport and storage of all water samples, including those for biological tests. A major source of error that is often neglected is the sampling strategy itself of the probes to be analysed. During the project lifetime, several probes will be taken and analysed to determine their composition and concentration. A standardised sampling method for offline samples ensures repeatability and accurate results. Furthermore, the Hydroptics platform will perform online concentration measurements in a flowing stream (such as a pipeline). The correct placement and orientation of the siphoning tube must be determined to obtain representative samples.

3.5. ASTM

ASTM International is an international standards organization that develops and publishes voluntary consensus technical standards for a wide range of materials, products, systems and services [14]. It has no role in requiring or enforcing compliance with its standards, unless external corporations or governments directly reference them in their laws. Many International companies rely heavily on ASTM standards and often require compliance of products with these standards. Especially in the chemical industry it is often considered a barrier of entry, whereby companies are reluctant to use products without an approved ASTM standard. The Hydroptics platform should take this into account by keeping an updated list of applicable ASTM standards.

Relevant ASTM standards include:

ASTM D7678-11 - Standard Test Method for Total Oil and Grease (TOG) and Total Petroleum Hydrocarbons (TPH) in Water and Wastewater with Solvent Extraction using Mid-IR Laser Spectroscopy

This test method covers the determination of total oil and grease (TOG) and total petroleum hydrocarbons (TPH) in water and waste water that are extractable by this test method from an acidified sample with a cyclic aliphatic hydrocarbon (for example cyclohexane, cyclopentane) and measured by IR absorption using a mid-IR laser spectrometer.

ASTM D3370-18: Standard Practices for Sampling Water from Flowing Process Streams

The goal of sampling is to obtain for analysis a portion of the main body of water that is representative. The most critical factors necessary to achieve this are points of sampling, and materials selection, system design, time of sampling, frequency of sampling, and proper procedures to maintain the integrity of the sample prior to analysis.

3.6. CEN and CENELEC

The core purpose of CEN and CENELEC is to develop European Standards (EN) and other publications, including Technical Specifications (TS), Technical Reports (TR) and Workshop Agreements (CWA) [15]

The close collaboration between CEN and CENELEC was consolidated at the start of 2010 by the creation of a common CEN-CENELEC Management Centre (CCMC) in Brussels which is in charge of the daily operations, coordination and promotion of all CEN and CENELEC activities. [16] It is the primary contact address for businesses wanting to standardise their products.

By setting common standards that are applied across the whole of the European single market, CEN and CENELEC ensure the protection of consumers, facilitate cross-border trade, ensure the interoperability of products, encourage innovation and technological development, include environmental protection and enable businesses to grow. Products and services that meet these European Standards (ENs) can be offered and sold in all of the participating countries (including Austria and Turkey) [17]. Together, CEN and CENELEC provide a platform for the development of European Standards and other technical specifications across a wide range of sectors.

3.6.1. CEN/CENELEC Workshop Agreement (CWA)

The most relevant publication for the Hydroptics project (or all H2020 project in general) by CEN and CENELEC is the CEN/CENELEC Workshop Agreement (CWA) introduced in 1997. This publication is intended to satisfy market demands for a more flexible and timelier alternative to the traditional European Standard (EN), but one which still possesses the authority derived from the openness of participation and agreement inherent in the operations of CEN or CENELEC and their national members. It is this openness that distinguishes the CWA from documents developed by industry consortia featuring limited participation (such documents are commonly known as de facto standards). [18]

In innovative markets there is often a demand for a best-practice document to be developed as a stepping stone to further standardization deliverables, to facilitate interoperability and compatibility and facilitate further incremental innovations in the market. However, if an innovative technology has not yet achieved a sufficient degree of stability, a European Standard may not be the best way of meeting this need, because of the nature of the standardization process and the requirement that all CEN/CENELEC (national) members adopt the resulting standard [19]. Workshops on the other hand are fast and relatively informal and are open to direct participation of any interested party. The result of the work is published as a CEN/CENELEC Workshop Agreement (CWA). Workshops are particularly suited for experimental topics, often in connection with the output from research and innovation projects. The average timeframe for the delivery of a CWA is 18 months, allowing CWAs to be integrated in the lifetime of an R&D project [20].

Through the participation in a CEN/CENELEC workshop, a CEN/CENELEC workshop agreement (CWA) can be developed during the Hydroptics project. The Workshop Agreement is announced and possibly made available at national level, though conflicting national normative documents may continue to exist. Specific standardisation activities related to the Hydroptics platform are listed below.

The general process to participate in a CEN/CENELEC workshop is outlined in [19] and can be summarised as follows:

- CWA Proposal: The proposal of a new CWA leads to the creation of a new workshop. A draft project plan shall be prepared as well as a self-assessment analysis of the degree of interest in the subject in different European Countries. The proposal can be prepared with the help of the CCMC.
- Workshop announcement: If no concerns are raised by any CEN/CENELEC BT member, the workshop is set up and the kick-off meeting date shall be announced.

- Launching the Workshop: The workshop secretariat shall be allocated to a particular CEN/CENELEC (national) member. The kick-off meeting will take place at least 30 days after the publication of the project plan and CWAs shall be developed in English
- Commenting phase: When the Workshop Chair determines that the Workshop participants have reached agreement on the draft text of the CWA, the drafting stage is complete. If the CWA is in the same domain as an existing CEN/CENELEC technical body, the draft CWA shall be sent to that technical body for comments at the same time as it is sent to the workshop participants. An open commenting phase could be followed for the sake of transparency but is not required.
- Approval and Availability: The Workshop Chair shall decide when the Workshop participants have reached agreement on the final text of the CWA, on the basis of the comments received and any further consultation that has taken place, at which point the CWA is approved.

Some possible technologies that might be standardised within the Hydroptics platform include:

- Integration of a representative and repeatable sample withdrawal system into a continuously flowing stream
- Test method for online oil in water extraction using cyclohexane and substance analysis with frequency combs emitting in the Mid-IR region.
- Maintenance-free online centrifugal separator for the reliable separation of organic and water phase.
- Enhanced absorption spectra by Mach-Zehnder Interferometry.
- Advanced particle identification and characterisation using a Hyperspectral Imaging System (HIS)
- Data analytics for monitoring and predicting critical process parameters

4. Identified Issues

At this time of the project no issues have been identified.

5. Long-Term Strategy

The most important aspect when it comes to regulatory and standardisation activities is to capture all relevant innovations. This is achieved by using an exploitation table shown in Table 1 where each partner is required to keep the list up to date on a rolling basis. Each innovation can be then be linked to either existing standards or it is determined that a new standard is required. In this case a CWA would be the desired approach.

At M24 when the first Hydroptics platform has materialized it will be decided which path will be taken:

- Option A: Comply with existing standards
- Option B: Initiate a CEN/CENELEC Workshop Agreement (CWA)

Deliverable D2.6 (M24) will evaluate the state of innovations and outline which standards are applicable for the Hydroptics platform.

Hydroptics

List of Exploitation Activities

Partner (main)	Title	Description[1]	Goal	Responsible Person	Contact data[2]	Date		Type of IPR[3]	Asset Allocation	Other partner involved[4]
						Month	Year			

[1] Please write a short description of the activity/product

[2] E-Mail, telephon number of the responsible person in the company

[3] If planned, write the kind of IPR you plan: patent, standard procedure,

[4] Fil lin this domain, if the activity/product was developed with other parner of the consortium

Table 1: Hydroptics Exploitation Table

Conclusion

This report aims to address regulatory and standardisation aspects during the project's lifetime. The CE marking was identified as the crucial certification to bring a product to the market in any European country or in Turkey. A list comprising relevant EU directives that a product must comply to obtain the CE mark, was devised. To clarify any discrepancies between EU and Turkish regulations, a questionnaire was sent to TÜPRAS. While not being part of the EEA, Turkey still requires products to bear the CE mark.

To comply with the EU directives, a list of harmonised standards by the 3 European Standardisation Organisations was created. By adhering to these standards, one should in practice automatically also fulfil the EU directives. At this point the list includes only potentially relevant standards for a future prototype.

A CEN/CENELEC Workshop agreement was proposed as an option for standardisation if required, and if the Hydroptics platform does not fit into existing standards.

Finally, a long-term strategy for regulatory and standardisation aspects will make use of an exploitation table to be kept up to date by each partner. It provides an overview of each component developed during the Hydroptics platform and facilitates the allocation to the most relevant standard.

List of Abbreviations

Abbreviation	Translation
AC	Alternating Current
ANSI	American National Standards Institute
ASTM International	American Society for Testing and Materials International
ATEX	Atmospheres Explosibles
CCMC	CEN-CENELEC Management Centre
CE	Conformité Européenne
CEN	European Committee for Standardisation
CENELEC	European Committee for Electrotechnical Standardization
CSTR	Continuously-Stirred Tank Reactor
CWA	CEN/CENELEC Workshop Agreement
DC	Direct Current
DIN	Deutsche Industrienorm
EEA	European Economic Area
EMC	Electromagnetic Compatibility
EN	European Standard
ESO	European Standardisation Organisations
ETSI	European Telecommunications Standards Institute
EU	European Union
GCC	Gulf Cooperation Council
GSO	GCC Standardization Organization
HIS	Hyperspectral Imaging System
ICT	Information and communications technology
ISO	International Organization for Standardization
LVD	Low-Voltage Directive
LOD	Limit of Detection
OJEU	Official Journal of the European Union
MID	Measuring Instruments Directive
MIR	Mid Infrared
PED	Pressure Equipment Directive
RoHS	Restriction of the use of certain hazardous substances

Abbreviation	Translation
Rpm	Round per minute
TOG	Total Oil and Grease
TPH	Total Petroleum Hydrocarbons
TSE	Turkish Standards Institution
SMIIC	Standards and Metrology Institute for the Islamic Countries
WKO	Wirtschaftskammer Österreich

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