Comparison of current Australian Standard with updated ISO standard

Current Australian Standard	ISO 4373-2008	Hydrometry – Water level measuring devices
Updated ISO Standard	ISO 4373-2022 (amended 2021)	Hydrometry – Water level measuring devices

High-level comment on differences

The ISO 4373:2021 version generally contains more content which is relevant and applicable than the 2008 version. ISO 4373:2022 is essentially the same as 2021 with some slight extra content.

Mark Hopper
21/10/2022

Reviewer recommendation

I recommend that the technical committee

- accept the updated ISO 4373-2022 version in full to replace current AS.

options
• *accept the updated ISO in full to replace current AS (simplest option!)*
• *reject the updated ISO and withdraw the current AS (in cases where the update is not appropriate for Australian practice)*
• *reject the updated ISO and re-confirm the current AS without change (an alternative option in cases where the update is not appropriate for Australian practice)*
• *further work required to adapt the ISO for an updated AS (non-preferred option, exceptional cases only)*

Detailed summary of differences

The table below outlines in more detail a summary of the differences between the current Australian Standard under review and the relevant updated ISO standard and includes reviewer comment where relevant.

Column 1: Identifies the number and name of the section in the current Australian Standard

Column 2: Classification of the change for that section. Classified as either:

- ***No change*** *(green shading) – The updated ISO is the same as the current Australian Standard.*
- ***Minor change*** *(blue shading) – Changes that have minimal impact on the outcome, including*
  - *minor format, style or heading changes*
  - *minor additions, removals or changes to a few words or clauses*
  - *addition or exclusion of more detailed explanation*
  - *very minor changes to steps or processes.*
- ***Significant change*** *(orange shading)– Changes that have a moderate to major impact on the outcome, such as*
  - *Changes to requirements*
  - *Significant changes to calculations, steps or processes.*

Column 3: More detail to describe the change, and comment from the reviewer (enough detail for the consideration of AHA and WaMSTeC members in their review).

Text colour is used in this column as follows:

- *Black text – More detailed explanation of the changes and reviewer comment. Specific reviewer comment on the changes highlighted in yellow.*
- *Blue text – reference to information included in the updated ISO that is not in the current Australian Standard*
- *Red text – reference to information included in the current Australian Standard that is not in the updated ISO.*

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
Forward	Minor change	2022 has added extra content in Forward
		2022 has added an Introduction
1. Scope	Minor change	2021 has added extra content to 2008. 2022 has added extra reference to Annex B Reviewer comment: Adopt the 2022 standard.
2. Normative References	Minor change	2021 & 2022 are the same but are reworded versions of 2008. All references are the same. Reviewer comment: Adopt the 2022 standard.
3. Terms and Definitions	Minor change	2021 & 2022 are the same and have extra content relating to ISO & IEC maintaining a terminology databases Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
4. Instrument Specification 4.1 Performance Classifications 4.2 General	Significant change	20021&2022 – same content 4.1 Titled – Performance parameters BUT 2021/2022 have been reworded. Content is similar to 2008. 20021&2022 – same content 4.2 Titled – Performance classification. 2021/2022 have been reworded. Content is similar to 2008. 2021/2022 has additional content and a Table 2 listing the characteristics of operational water level measuring devices. Change between 2021 and 2022 in Table 2 – 2021 – has column Typical Resolution whereas 2022 has Typical Uncertainty which have very different values. Reviewer comment: Adopt the 2022 standard.
4.3 Maximum rate of change	Minor change	4.3. 2021 & 2022 are the same 2018 and 2021/2022 are the same expect for c) response time of instrument where a detailed definition is provided in the 2021 & 2022 content Reviewer comment: Adopt the 2022 standard.
4.4 Environment 4.4.1 General 4.4.2 Temperature 4.4.3 Relative humidity	No Change	4.4.1 – 2018, 2021 & 2022 are the same. 4.4.2 - 2018, 2021 & 2022 are the same. 4.4.3 - 2018, 2021 & 2022 are the same. Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
4.5 Timing 4.5.1 General 4.5.2 Digital 4.5.3 Analogue	Significant change	4.5.1 – 2018, 2021 & 2022 are the same except 2021/2022 have an extra paragraph relating to several raw data samples are assembled. 4.5.2 - 2018, 2021 & 2022 are the same except for timing error. 2018 = 150s while 2021/2022 – 60s 4.5.3 - except for timing error. 2018 = 15mins while 2021/2022 – 5min. Reviewer comment: Adopt the 2022 standard.
5. Recording 5.1 Chart Recorders	No Change	5.1 – 2018, 2021 & 2022 are the same. Reviewer comment: Adopt the 2022 standard.
5.2 Data Loggers	Significant change	2018 – Two sentences 2021 – Expanded section with general format for time stamp. Contains 2018 content. 2022 – Includes 2018 content but greatly expanded content. The general format for time stamp as outlined in 2021 has been changed totally. Reviewer comment: The ISO 2022 change is recommended as it provides additional detail. Adopt the 2022 standard.
6. Enclosure	Minor Change	2021 – Content same as 2018 but contains extra sentence relating national regulations 2022 – Content is the same as 2018 with the extra sentence in 2021 removed. Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
7. Installation	Minor Change	2008 – One short sentence 2021 – Includes 2018 sentence plus greater details especially for floatwells and non contact sensors 2022 – Includes same content as 2021 but has been reworded in some sentences. Reviewer comment: Adopt the 2022 standard.
	Significant change	2021 & 2022 – same content Section 8 Titled – Maintenance. Contains several paragraphs Reviewer comment: Adopt the 2022 standard.
8. Estimation of measurement uncertainty 8.1 General	Significant change	2008 – Uncertainty has two causes 2021 – Section 9 - Has 5 causes (3 extra) 2022 – Section 9 - Has 6 causes (1 extra) and includes extra paragraph explaining uncertainty. Reviewer comment: Adopt the 2022 standard.
8.2 Type A Estimation	Significant change	2008 – One paragraph 2021 – Same paragraph plus extra 2 paragraphs. Section 9.2 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
8.3 Type B Estimation	Significant change	2008 – Initial paragraph same in 2021 and 2022 2021 – 2008 second paragraph has been reworded but content same meaning. Includes extra critical sentence at end. Section 9.3 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.
	Significant change	2008 – Not included 2021 – Extra. Section 9.4 – Uncertainty in case of low stage conditions. 2022 – Extra. Section 9.4 – Uncertainty in case of low water level conditions. Different heading but same content. Reviewer comment: Adopt the 2022 standard.
8.4 Level Measurement Datum	Significant change	2008 – Two sentence paragraph 2021 – Section 9.5 – Same sentence plus extra content in paragraph. Same heading as 2008. Contains extra second paragraph 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.
8.5 Combining Primary Measurement Uncertainties	Significant change	2008 – Two paragraphs with formula 2021 – Section 9.6 – Same heading as 2008. Includes same content as 2008. Contains extra second paragraph 2022 – Identical to 2021 but has expanded formula. Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
Appendix A Types of Water Level Measuring Devices		Complete reorganization of appendix. 2008 – Starts with A1 Staff and Ramp Gauges while 2021/2022 with Echo location, radar instruments. Reviewer comment: Adopt the 2022 standard.
Appendix A Types of Water Level Measuring Devices A.1.1 Staff & Ramp Gauges	Significant change	2008 - Description, Materials, Strengths, Weaknesses, Uncertainty 2021 – Section A.8 – Contains same content as 2008 except some extra content in Materials, Weaknesses and Uncertainty refers to a common formula as opposed to the included formula in 2008. 2022 – Identical to 2021 except Weaknesses included extra content. Reviewer comment: Adopt the 2022 standard.
Appendix A Types of Water Level Measuring Devices A.1.2 Wire or Tape Weight Gauge	Significant change	2008 - Description, Materials, Strengths, Weaknesses, Uncertainty (contains an example) 2021 – Appendix B (Manually Operated Measuring Devices) – B.1 Contains same content as 2008 except some extra content in Weaknesses, Strengths and Uncertainty does not contain an example. 2022 – Identical to 2021 except Weaknesses included extra content. Reviewer comment: Adopt the 2022 standard.
Appendix A Types of Water Level Measuring Devices A.1.3 Hook and Point Gauges	Significant change	2008 - Description, Materials, Strengths, Weaknesses, Uncertainty (contains an example) 2021 – Appendix B (Manually Operated Measuring Devices) – B.2 Contains same content as 2008 except does not contain an example. 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
Appendix A Types of Water Level Measuring Devices A.1.4 Dippers	Significant change	2008 - Description, Materials, Strengths, Weaknesses, Uncertainty (contains an example) 2021 – Appendix B (Manually Operated Measuring Devices) – B.3 Contains same content as 2008 except extra content in Description and does not contain an example. 2022 – Identical to 2021 except extra content in Materials. Reviewer comment: Adopt the 2022 standard.
Appendix A - Types of Water Level Measuring Devices A.2 Peak Level Gauges	Significant change	2008 - Description, Materials, Strengths, Weaknesses, Uncertainty (contains an example) 2021 – Appendix A – A.7 Same content as 2008 except does not contain an example. 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.
Appendix A - Types of Water Level Measuring Devices A.3 Mechanical Float & Counterweight gauges	Significant change	2008 - Description, Materials, Strengths, Weaknesses, Uncertainty. 2021 – Appendix A – A.3 Reworded content as 2008 with extra content in Description, Strengths, especially Weaknesses. Uncertainty is the same 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.
Appendix A - Types of Water Level Measuring Devices A.4 Air Reaction gauges	Significant change	2008 – Principle of Operation, General, Description, Materials, Strengths, Weaknesses, Uncertainty. 2021 – Appendix A – A.4 Reworded content as 2008 with extra content in Principle of Operation, Strengths, Weaknesses. Otherwise, the same. Removal of “Mercury Manometer Bubbler gauges” section. 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
Appendix A - Types of Water Level Measuring Devices A.5 Electrical Pressure Transducers	Significant change	2008 – Description, Strengths, Weaknesses, Uncertainty. 2021 – Appendix A – A.5 Same content as 2008 with extra content in Weaknesses. 2022 – Identical to 2021 except extra content in Strengths, Weaknesses and Uncertainty. Reviewer comment: Adopt the 2022 standard.
Appendix A - Types of Water Level Measuring Devices A.6 Echo Location, Acoustic Instruments	Significant change	2008 – Two sections – Instruments with sound path in air and in water - Description, Strengths, Weaknesses, Uncertainty. 2021 – Appendix A – A.2 Air -Reworded content as 2008 with extra content in Description, especially Weaknesses. Diagram removed from air section. Water - Reworded content as 2008 with extra content in Description, Weaknesses. Same for Strengths. 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.
Appendix A - Types of Water Level Measuring Devices A.7 Echo Location, Radar Instruments	Significant change	2008 – Description, Strengths, Weaknesses, Uncertainty. 2021 – Appendix A – A.1 A significant change in content. Significantly more content in Description, Strengths, Weaknesses and Uncertainty. 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.

Section (ISO4373:2008 section number)	Classification of change ISO 2008 to ISO 2022	More detail and comment on changes in the updated ISO 2022
Appendix A - Types of Water Level Measuring Devices A.8 Systems using Electrical Properties	Significant change	2008 – Three sections – Systems measuring Capacitance, Resistance (Direct) and (Indirect) - Description, Strengths, Weaknesses, Uncertainty. 2021 – Appendix A – A.6 Capacitance -Reworded content as 2008 with extra content in Description, Weaknesses. Direct - Same content as 2008 with extra content in Weaknesses. Indirect - Same content as 2008. 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.
Appendix A - Types of Water Level Measuring Devices A.9 Recording Devices	Significant change	2008 – Two sections – Analogue and Digital - Description, Strengths, Weaknesses, Uncertainty. 2021 – Appendix C – C.1 Analogue - Same content as 2008 with extra content in Weaknesses. C.2 Digital – Reworded content for Strengths and Uncertainty including formula. Other headings the same content. 2022 – Identical to 2021. Reviewer comment: Adopt the 2022 standard.
Bibliography	Minor Change	2008 – One reference. 2021 – Two references. Added WMO-No 168:2008. 2022 – Removed WMO reference. Reviewer comment: Adopt the 2022 standard.
	Significant change	ANNEX G (informative) Extrapolation of a stage discharge relationship • Parts included in AS in the main document Reviewer comment: Adopt ISO annex.