Comparison of current Australian Standard with updated ISO standard

Current Australian Standard	AS 3778.6.2	Part 6.2: Measurement devices, instruments and equipment – Direct depth sounding and suspension equipment
Updated ISO Standard	ISO 3454	Hydrometry – direct depth sounding and suspension equipment

High-level comment on differences

Both documents are similar in content, with several differences in the arrangement of information and differences in some specifications. Yet, the major difference between the ISO and AS documents is their use of auxiliary verbs, with the ISO using “shall” and “will be” to make conformance to criteria mandatory, whereas the AS uses “should” and “may be”, language which provides less obligation for conformance. Although a seemingly small adjustment, these auxiliary verbs make significant and potentially onerous changes to the minimum requirement for conformance with the standard. I have marked sections where changes to these verbs have been made as significant, even where remaining content changes are minor or negligible.

A second area where differences are broadly evident is an increased emphasis on safety in the ISO document, with greater explicit requirement for assessment and quantification of loads imposed on equipment. I believe contemporary work health and safety legislation was introduced in the early 2000s, after this AS was published (1992) and may take precedence over some tasks listed in the AS. The obligations for safety conformance made in the ISO may be unattainable in practice – due to prohibitive cost in engineering and assessment – and may render some tasks as obsolete due to unacceptable risks involved.

In summary, the ISO contains greater obligations to conform to listed criteria and a greater emphasis on safety. An update may result in the loss of some flexibility in applying the standard and could result in difficulties completing tasks in conformance with the standard due to stronger standards of safety .

Reviewer recommendation

I recommend that the technical committee accept the updated ISO in full to replace current AS

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 (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
0 Introduction	Minor change	The subject of the introductory paragraph in the ISO document relates to the choice of equipment based on conditions and method, i.e. " The *choice* of suspension and sounding equipment depends on …", as opposed to the subject of the introductory paragraph in the AS document, which relates to the objective of the undertaking, i.e. "The *object* of sounding is to…". Both paragraphs suitably introduce the topic.
1 Scope and field of application	Minor change	The AS document explicitly excludes "indirect methods such as echo sounding" in the scope, whereas the ISO document does not provide this exclusion explicitly. Rather, it is implied in the title and what is included in the scope. The ISO document specifically excludes "bankside cableway systems" from the scope of application, whereas the AS document does not provide this exclusion explicitly.
2 Units of measurement	Minor change	This section is not included in the ISO document. The AS states "The units of measurement used are SI units." This statement is probably superfluous in any case, as units of measurement are provided where applicable or are not relevant to the statements being made.
3 References	Minor change	The AS makes reference to ISO 748 (Velocity-area methods), ISO 772 (vocabulary and symbols) and ISO 4375 (Cableway system of stream gauging), whereas the ISO document makes reference to ISO 772 only. The following statement also appears in the ISO document, "For dated references, only the edition cited applies. For undated references, the latest edition […] applies".
4 Definitions, symbols and abbreviations	Minor change	The statement made in the AS document under this heading is essentially equivalent to the statement made in the ISO document under Section 4 – Terms and Definitions, with minor changes to the wording.

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
5 Sounding equipment	Major change	Differences in wording and specification of requirements in this section include: • Minor variations in the nomenclature and definition of equipment • Some superficial changes to the layout of the information • ISO states that the rod '**shall** be held in a vertical position" and that "for measurements by sounding line, appropriate weights **shall** be attached to keep it as close as practicable to vertical", whereas the AS stated that sufficient weight "**should** be attached to maintain the cable in position as near to vertical as possible".
6 Suspension equipment	Major change	**6.1 General requirements** The ISO states that the "method of deployment **shall** be in accordance with local health and safety regulations". This wording is not included in the AS.
6 Suspension equipment	Major change	**6.2 Rod suspension equipment** Differences in wording and specification of requirements in this section include: • Changes to the layout of information; the ISO splits this section into general matters, hand-held suspension equipment and mechanically operated suspension equipment. • The ISO specifies limits for the use of hand-held rigid-rod suspension equipment at water depth and velocity of approximately 1 m and 1 m/s, respectively. The AS states that "hand-held rod suspension equipment should be simple to use in water of depths up to [redacted] m and velocities up to [redacted] m/s". • The ISO states that "mechanically operated rigid rod equipment is preferable". Both ISO and AS documents state that this equipment is more accurate, but is heavier and requires careful installation and skilled operation. • The ISO states that "Limitations on the use of this equipment **shall** be clearly established and attached to the equipment so that safe working limits are not exceeded". The AS does not state this requirement explicitly.

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
6 Suspension equipment	Major change	**6.3 Cable suspension equipment** Differences in wording and specification of requirements in this section include: • The ISO makes reference to ISO 4375 (Cableway systems for stream gauging) in this section. • Minor wording changes in the specification of attaching weights. • In referring to hand-line (hand operated) suspensions the ISO states that "Its application **shall** be limited to use with weights up to [redacted] kg and velocities up to [redacted] m/s", whereas the AS specifies these "**should** be capable of use with weights up to [redacted] kg" and does not specify a velocity limit. • The ISO states that "This type of equipment **shall** include an automatic break and a means of overload protection", whereas the AS does not specify this requirement. • Both documents contain reference to near identical annexes specifying the selection of weights for cable suspension equipment (see below).
7 Cable measurement corrections	Major change	Information contained in this section of the AS is primarily contained in section 5.2.3 (Cable suspension equipment) of the ISO document. Differences include: • The AS states that "Where the suspension cable exceeds an angle of [redacted] with the vertical, an unacceptable error **may** be introduced. The magnitude of such errors **may** be determined by reference to ISO 748". • The ISO specifies that if there is deviation from the vertical, depth correction **will** be required, including an "air-line" correction and a "wet-line" correction, for the sections of the cable hanging in air and underwater, respectively. These corrections are outlined in Annex B of the ISO, which is not present in the AS document.

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
8 Specific requirements	Major change	**8.1 Rods for sounding and suspension** The nomenclature of equipment is slightly different between the two documents. **8.1.1 Hand-held rods** The following are stated in the AS but not in the ISO: • The rod should be constructed of corrosion resistant material. • Graduation increments of [redacted] m, [redacted] m and [redacted] m should be clearly identified • Graduations should remain visible when the rod is wet and should be wear-resistant. • Graduations should be visible from all angles. • The rod should incorporate a movable mounting for mounting equipment and a means of conveying an electrical signal to the top of the rod. • Provision may be made for a secondary rod which allows the setting of the meter from the top of the rod. • It should be easy to hold, especially when wet or cold. **8.1.2 Mechanically operated rods** Differences in wording and specification of requirements in this section include: • Slight variation in the nomenclature and definition of equipment • Both the AS and ISO documents specify that equipment in this section adhere to items listed in the previous section (8.1.1 and 6.1.1, respectively), although the ISO stipulates this using the stronger auxiliary verb "**shall**" • The ISO document states that "the suspension rod **shall** have a suitable stabilizing arrangement to enable it to maintain proper orientation…" • Both documents specify the use of locking mechanisms and/or breaks, counter-weights/stabilization and securing, although the ISO document stipulates these requirements using the auxiliary verb "**shall**", as well as using more specific and stronger language in some instances. • The AS suggests that the equipment should have "a means for easily determining the rod position", this being broadly inferred in the ISO.

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
8 Specific requirements	Major change	**8.2 Cable sounding and suspension equipment** **8.2.1 Cable** The AS and ISO documents have similar specifications regarding cables, although the ISO stipulates requirements using the stronger auxiliary verb "**shall**". The ISO document also states some requirements in somewhat simpler terms, e.g. simply requiring the whole cable is "suitable covering to prevent discomfort or injury".

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
8 Specific requirements	Major change	**8.2.2 Winding reels** The ISO document names this section "6.2.3 Gauging reel" and splits all information contained in these AS sections into sub-sections, namely: General, Hand wound reels, Motorized reels, and; Vehicle- and boat-mounted cranes. As with previous sections, the ISO document stipulates requirements using the stronger auxiliary verb "**shall**" <u>ISO 6.2.3.1 General</u> The ISO states that the reel **shall** have a device incorporated to limit overload. The ISO states that this device **shall** be capable of an overload force exerted of twice the maximum sinker weight specified by the reel. The ISO states that it "**shall *be possible*** to fix the reel securely to the supporting device..." and that the fixing **shall** be able to withstand a load equal to five times the SWL specified for the reel. The ISO states that a plug and socket connection **shall** be used to connect the reel to controllers and other instruments <u>ISO 6.2.3.2 Hand wound reels</u> The ISO has greater emphasis and more detailed specification on the requirements for breaking systems. The ISO recommends cranking effort (by hand) should be less than [redacted] kg. <u>ISO 6.2.3.3 Motorized reels</u> The ISO states the following: "It **shall** not be possible for the load to over-run the motor drive system" "The motor drive train **shall** be able to withstand the load applied to the sounding line equal to the load limited setting" "Motor controls **shall** be designed to revert to the 'off' position when controls are released"

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
8 Specific requirements	Major change	**8.2.3 Supports and mounting structures for winding reels** This section is broadly comparable to ISO section 6.2.4 Vehicle- and boat-mounted cranes with the following differences: Most of the requirements stated in this section of the ISO document use the auxiliary verb "shall" as opposed to "should". This includes the requirement for adequate strength, proper design, use of a protractor and use of counter-weights. Cranes are required to have a SWL equal or greater than [redacted] times that of the gauging reel.
8 Specific requirements	Major change	**8.3 Sounding weights** The AS section 8.3 is contained as a sub-section of the ISO section 6.2 Cable suspension equipment. The ISO provides reasoning for the use of weights separate to the specific requirements for use. The ISO document uses the auxiliary verb "**shall**" to make explicit the requirements for weights used to be a) designed to minimise resistance to flow and effect on the current meter and b) not exceeding the SWL of the equipment in use.
Annex	Minor change	**Estimation of sounding weight mass to suit velocity and depth** The AS states that the Annex forms part of the standard, whereas the equivalent Annex A in the ISO is stated as 'informative' only. The two Annexes are essentially equivalent, although the ISO makes reference to manual handling and safety considerations when considering the shape and size of the weight, whereas the AS refers to practicality in these considerations.
Annex	Major change	The ISO contains a second annex, Annex B on corrections for length/depth of sounding line for non-perpendicular angles. The AS specifies reference to ISO 748 in Section 7 for calculating these corrections.