

## Comparison of current Australian Standard with updated ISO standard

Current Australian Standard	AS 3778.5.3	Liquid flow in open channels and partly filled pipes – Guidelines for the application of Doppler-based flow measurements
Updated ISO Standard	ISO 15769	Hydrometry – Guidelines for the application of acoustic velocity meters using the Doppler and echo correlation methods

### High-level comment on differences

There is a significant difference in content between the Australian Standards and the updated ISO standards. The Australian Standards was based on the initial ISO standards on “Guidelines for the application of acoustic velocity meters using the Doppler and echo correlation methods”. The initial ISO document lacked significant information on this topic and the reason why there is such a huge difference in content.

### Reviewer recommendation

I recommend that the technical committee

- Accept the updated ISO in full to replace current AS (simplest option!).

<i>options</i>
<ul style="list-style-type: none"><li>• <i>accept the updated ISO in full to replace current AS (simplest option!)</i></li></ul>
<ul style="list-style-type: none"><li>• <i>reject the updated ISO and withdraw the current AS (in cases where the update is not appropriate for Australian practice)</i></li></ul>
<ul style="list-style-type: none"><li>• <i>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)</i></li></ul>
<ul style="list-style-type: none"><li>• <i>further work required to adapt the ISO for an updated AS (non-preferred option, exceptional cases only)</i></li></ul>

## 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
<b>1. Scope</b>	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (1) minor word changes.</li> <li>The Australian Standard includes reference on the applicability of the instruments and</li> </ul>
<b>2. Normative references</b>	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (1) minor word changes.</li> <li>The updated ISO removed reference to ISO/TR 8363 and added ISO/TR 25377:2007.</li> </ul>
<b>3. Terms and definitions</b>	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (3.1.1 – 3.1.15) expanded the terms and definitions used</li> </ul>
	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (3.2) created a new section “Abbreviated terms”</li> </ul>
<b>4. Principle</b>	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (4.1) created a sub section “Ultrasonic Doppler”</li> <li>The updated ISO (4.1) minor word changes.</li> </ul>
	Significant Change	<ul style="list-style-type: none"> <li>The updated ISO (4.2) created a new section outlining the “Operating Techniques” used (Continuous wave, Pulsed incoherent, pulse to pulse coherent and broadband</li> <li>SIGNIFICANT DIFFERENCE IN CONTENT</li> </ul>
	Significant Change	<ul style="list-style-type: none"> <li>The updated ISO (4.3) created a new section outlining “Bed-mounted Doppler systems”</li> <li>SIGNIFICANT DIFFERENCE IN CONTENT</li> </ul>
	Significant Change	<ul style="list-style-type: none"> <li>The updated ISO (4.4) created a new section outlining “Side-looking/horizontal ADCP’s”</li> <li>SIGNIFICANT DIFFERENCE IN CONTENT</li> </ul>
	Significant Change	<ul style="list-style-type: none"> <li>The updated ISO (4.5) created a new section outlining “Acoustic (echo) correlation method”</li> <li>SIGNIFICANT DIFFERENCE IN CONTENT</li> </ul>

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
	Significant Change	<ul style="list-style-type: none"> <li>The updated ISO (4.6) created a new section outlining “Velocity-index ratings”</li> <li><b>SIGNIFICANT DIFFERENCE IN CONTENT</b></li> </ul>
5 Factors affecting operation and accuracy 5.1 General	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.1) minor word changes</li> </ul>
5.2 Characteristics of the instrument 5.2.1 General considerations	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.2.1) minor word changes</li> </ul>
5.2.2 Ultrasonic beam angle	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.2.2) minor word changes</li> </ul>
5.2.3 Beam “width”	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.2.3) minor word changes</li> </ul>
5.2.4 Ultrasonic frequency	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.2.4) minor word changes</li> </ul>
5.2.5 Method of determining velocity of sound	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.2.5) minor word changes</li> </ul>
5.2.6 Signal processing	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.2.6.1) minor word changes</li> <li>The updated ISO (5.2.6.1) created a separate section for Continuous wave Doppler-based technologies.</li> </ul>
	Minor Change	<ul style="list-style-type: none"> <li>The updated ISO (5.2.6.2) created a separate section for Time/range gating technologies.</li> </ul>
5.2.7 Depth measurement	Minor Change	<ul style="list-style-type: none"> <li>The Australian Standard provides information on Depth measurement</li> <li>The updated ISO (5.2.7) created a new section outlining the instrument position and portion of the cross-section sampled.</li> </ul>

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
	Minor Change	<ul style="list-style-type: none"> <li>• The updated ISO (5.2.7.1, 5.2.7.2, 5.2.7.3 &amp; 5.2.7.4) created 4 new sections outlining portion sampled compared to cross section               <ul style="list-style-type: none"> <li>• 5.2.7.1 General</li> <li>• 5.2.7.2 Bed-mounted Doppler Devices</li> <li>• 5.2.7.3 Side-lookers</li> <li>• 5.2.7.4 Echo correlation</li> </ul> </li> </ul>
5.3 Channel and Water characteristics 5.3.1 Channel geometry	Minor Change	<ul style="list-style-type: none"> <li>• The updated ISO (5.3.1.1 – 5.3.1.3) minor word changes</li> <li>• The updated ISO (5.3.1.1 – 5.3.1.3) created separate sections for Channel geometry               <ul style="list-style-type: none"> <li>• 5.3.1.1 General</li> <li>• 5.3.1.2 Bed-mounted sensors (Doppler and echo correlation)</li> <li>• 5.3.1.3 Side lookers</li> </ul> </li> </ul>
5.3.2 Depth	Minor Change	<ul style="list-style-type: none"> <li>• The updated ISO (5.3.2.1 – 5.3.2.2) minor word changes</li> <li>• The updated ISO (5.3.2.1 – 5.3.2.2) created separate sections for Depth               <ul style="list-style-type: none"> <li>• 5.3.2.1 Bed-mounted sensors (Doppler and echo correlation)</li> <li>• 5.3.2.2 Side lookers</li> </ul> </li> </ul>
5.3.3 Reflector density and efficiency	Minor Changes	<ul style="list-style-type: none"> <li>• The updated ISO (5.3.3) minor word changes</li> </ul>
5.3.4 Homogeneity	Minor Changes	<ul style="list-style-type: none"> <li>• The updated ISO (5.3.4) minor word changes</li> </ul>
5.3.5 Velocity of sound	No Change	
5.3.6 Siltation and sensor position	Minor Changes	<ul style="list-style-type: none"> <li>• The updated ISO (5.3.6) minor word changes</li> </ul>
5.3.7 The significance of depth uncertainty	Minor Changes	<ul style="list-style-type: none"> <li>• The updated ISO (5.3.7) minor word changes</li> </ul>

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
5.3.8 The effect of weed	Minor Changes	<ul style="list-style-type: none"> <li>Section <b>moved</b> to new section in the updated ISO (5.4).</li> <li>The updated ISO (5.4) <b>minor word changes</b></li> </ul>
6 General expectations of performance	Minor Changes	<ul style="list-style-type: none"> <li>Section <b>moved</b> to new section in the updated ISO (11.3).</li> <li>The updated ISO (11.3) <b>minor word changes</b></li> </ul>
	Significant Changes	<ul style="list-style-type: none"> <li>The updated ISO (6) <b>created a new section “Site Selection”</b></li> <li>The updated ISO (6.1, 6.2, 6.3 &amp; 6.4) <b>created 4 new sections outlining site selection</b> <ul style="list-style-type: none"> <li>6.1 General</li> <li>6.2 General site requirements for Doppler’s and echo correlation devices</li> <li>6.3 Bed-mounted ultrasonic Doppler and echo correlation devices</li> <li>6.4 Side-lookers</li> </ul> </li> <li><b>SIGNIFICANT DIFFERENCE IN CONTENT</b></li> </ul>
7 Considerations when selecting equipment	Minor Changes	<ul style="list-style-type: none"> <li>Section <b>moved</b> to new section in the updated ISO (12).</li> <li>The updated ISO (12) <b>minor word changes</b></li> </ul>
	Significant Changes	<ul style="list-style-type: none"> <li>The updated ISO (7) <b>created a new section “Measurements”</b></li> <li>The updated ISO (7.1, 7.2, &amp; 7.3) <b>created 3 new sections outlining site selection</b> <ul style="list-style-type: none"> <li>7.1 Velocity</li> <li>7.2 Water level</li> <li>7.3 Determination of cross-sectional area</li> </ul> </li> <li><b>SIGNIFICANT DIFFERENCE IN CONTENT</b></li> </ul>
8 Evaluation and verification	Minor Changes	<ul style="list-style-type: none"> <li>Section <b>moved</b> to new section in the updated ISO (9.1).</li> <li>The updated ISO (9.1) <b>minor word changes</b></li> </ul>

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
	Significant Changes	<ul style="list-style-type: none"> <li>• The updated ISO (8) created a new section “Installation, operation and maintenance”</li> <li>• The updated ISO (8.1 &amp; 8.2) created 2 new sections outlining installation, operation and maintenance <ul style="list-style-type: none"> <li>• 8.1 Installation considerations</li> <li>• 8.2 General maintenance considerations</li> </ul> </li> <li>• SIGNIFICANT DIFFERENCE IN CONTENT</li> </ul>
	Significant Changes	<ul style="list-style-type: none"> <li>• The updated ISO (9) created a new section “Calibration, evaluation and verification”</li> <li>• The updated ISO (9.1 &amp; 9.2) created 2 new sections outlining installation, operation and maintenance <ul style="list-style-type: none"> <li>• 9.1 General</li> <li>• 9.2 Calibration and performance checking</li> </ul> </li> <li>• SIGNIFICANT DIFFERENCE IN CONTENT</li> </ul>
	Significant Changes	<ul style="list-style-type: none"> <li>• The updated ISO (10) created a new section “Determination of Discharge”</li> <li>• The updated ISO (10.1 &amp; 10.2) created 2 new sections outlining installation, operation and maintenance <ul style="list-style-type: none"> <li>• 10.1 General</li> <li>• 10.2 Velocity-index ratings</li> </ul> </li> <li>• SIGNIFICANT DIFFERENCE IN CONTENT</li> </ul>

Section (AS section number)	Classification of change AS to ISO	More detail and comment on changes in the updated ISO
	Significant Changes	<ul style="list-style-type: none"> <li>• The updated ISO (11) created a new section “Uncertainties in discharge determinations”</li> <li>• The updated ISO (11.1, 11.2, 11.3 &amp; 11.4) created 4 new sections outlining installation, operation and maintenance <ul style="list-style-type: none"> <li>• 11.1 General</li> <li>• 11.2 Definition of uncertainty</li> <li>• 11.3 General expectations of performance</li> <li>• 11.4 Methodology of estimating the uncertainty in discharge determination</li> </ul> </li> <li>• <b>SIGNIFICANT DIFFERENCE IN CONTENT</b></li> </ul>
	Minor Changes	<ul style="list-style-type: none"> <li>• The updated ISO (12) created a new section “Points to consider when selecting equipment”</li> <li>• The updated ISO (12) minor word changes</li> </ul>
Annexures	Significant Change	<ul style="list-style-type: none"> <li>• The Australian Standards and updated ISO Annexures does not compare.</li> <li>• <b>SIGNIFICANT DIFFERENCE IN CONTENT</b></li> </ul>