

Early April 2014 The International Copper Association Australia (ICAA) released its new “Hydraulic Services E-Design Guide and Pipe Sizing for Plumbing”. Pleasingly the guide acknowledges that water velocities, in Hot potable Water Reticulation Systems (HWRS), are not covered under the current AS3500.4:2003.

Recommended Water Velocities				
Service	Velocity Range m/s.			
	Recommended Design Velocity m/s	Institute of Plumbing Australia Selection and Sizing of Copper Tubes for Water Piping Systems	Australian Standards AS 3500.4 2003 +Amend 1&2	British Standard BS 6700:2006 +A1:2009
Cold Water - Mains pressure water services pipelines	Up to 2.4 Up to 1.6 within Dwelling / Apartment	1.0 to 2.1	Max. 3.0	Max. 3.0
Cold Water - Gravity flow pipelines from upper level storage tanks – Top two floors only	0.1 to 0.4	0.1 to 0.4	Max. 3.0	Max. 3.0
Cold Water - Gravity flow pipelines from upper level storage tanks – below top two floors	1.0 to 2.1	1.0 to 2.1	Max. 3.0	Max. 3.0
Cold Water - Pump suction pipelines	1.2 to 2.1	1.2 to 2.1	Max. 3.0	Max. 3.0
Cold Water - Pump delivery pipelines	1.5 to 2.1	1.5 to 2.1	Max. 3.0	Max. 3.0
Heated water - Flow and return – circulating system	1.0	Not Specified	Not Specified	Max. 3.0
Heated water - Non-circulatory systems	2.0	1.0 to 2.1	Max. 3.0	Max. 3.0

Table 17.1  
Recommended Water Velocities for Cold and Heated Water Supplies

The International Copper Association Australia (ICAA) now recommends hot potable water velocities of **1.0 m/s (max.)** for Hot Potable Water Recirculation Systems (HWRS) and tells us that there is no velocity specified for HWRS under the current AS3500.4:2003.

The International Copper Association Australia (ICAA) also recommends hot potable water velocities of **2.0 m/s (max.)** for **non**-Hot Potable Water Recirculation Systems (HWRS), down from 3.0 m/s as per current AS3500.4:2003.

COMMITTEE WS-014

**DR AS/NZS 3500.4:2014**

(Project ID: 101814)

# Draft for Public Comment Australian/New Zealand Standard

LIABLE TO ALTERATION—DO NOT USE AS A STANDARD

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BEGINNING DATE FOR COMMENT: 13 October 2014

CLOSING DATE FOR COMMENT: 15 December 2014

*Important: The procedure for public comment has changed – please read the instructions on the inside cover of this document.*

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**Plumbing and drainage  
Part 4: Heated water services  
(Revision of AS/NZS 3500.4:2003)**

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## DRAFT for Public Comment **AS/NZS 3500.4:2014**

### 1.8 VELOCITY REQUIREMENTS

The maximum water velocity shall be in accordance with Table 1.8.

**TABLE 1.8**  
**MAXIMUM ALLOWABLE FLOW VELOCITIES**

System component	Water temperature (degrees C)	Maximum flow velocities (m/s)	
		Copper pipes	Other materials
Circulatory pipe	>60	1.2	1.5
	≤60	1.5	1.5
Other pipe work	N/A	3.0	3.0

**NOTES:**

- 1 Circulatory pipework means the pipework where there is forced circulation of heated water.
- 2 Circulatory pipework does not include—
  - (a) user activated or on-demand systems; and
  - (b) primary circulation in a solar water heater.

**Why does Standards Australia want to overrule the recommendations made by the ICAA (CDA Australia) on the 1<sup>st</sup> April 2014?**



# Recommendations by

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- Regardless of whether one considers continuous recirculation velocity or short-term simultaneous flow demand, it is apparent that the velocities permitted by AS/NZS 3500.4 for heated water services put the systems at significant risk of Erosion-Corrosion.
- The four case studies presented in this report make it clear that this risk of Erosion-Corrosion is not just a hypothetical risk, nor a gradual problem that might marginally reduce system life. Rather, it is a problem that has caused multiple pipe leakages (and consequent property damage) within 5–10 years of system construction.

## ***Recommendations***

In order that no Australian hydraulic designer, plumber or related person be in any doubt about the practices necessary to prevent Erosion-Corrosion failures, Australian Standards must urgently be updated to reflect what has been long established by overseas authorities. Failure to update the Standard would be expected to lead to further failures, likely consequences of which could include (a) litigation against designers and (b) unnecessary damage to the reputation of copper.

In an updated version of AS/NZS 3500.4, a rational set of guidelines to prevent Erosion-Corrosion would include (but not be restricted to) the following:

- Maximum water temperature not to exceed 70°C.
- For water temperatures in the range 60 to 70°C:
  - Continuous recirculating flow: 0.5 m/s.
  - Short-term simultaneous flow demand: 0.6–0.9 m/s.
- Maximum water pressure 550 kPa.

The current and widespread misinterpretation of a velocity of max. 3.0 m/s for hot potable water recirculation systems (please read **AS3500.4:2003 chapter 4.14.1**) is corrected emphatically to read max. 1.0 m/s for copper pipes in hot potable water recirculation systems (HWRS).

This recommended max. velocity of 1.0 m/s in HWRS is recommended to prevent internal erosion-corrosion of copper pipes.

Many International (Copper) associations and International Standards have for some time recommended a similar velocity:

- **Copper Development Association Inc. (CDA) U.S.A.**



- **Canadian Copper & Brass Development Association (CCBDA)**



- **Copper Development Association (CDA) U.K.**



- **German DIN1988-3 (followed by DIN1988-300)**



- **German DVGW worksheet W553**



- **Dutch KIWA**



The Copper Development Association Inc. (CDA) U.S.A. also advised in 1996 that “a copper alloy **C70600 (90:10 copper-nickel)** should be specified when water temperature is likely to exceed 140°F (60°C) and higher velocities are involved.”

The CDA U.S.A. also mentioned that “erosion-corrosion also can be a concern when the local water pressure exceeds about 80 psi (550 kPa)”.

**Why does Standards Australia want to “re-invent the wheel”?**

**Why all this waste of time and red tape?**

**Suggestion: Let’s simply adopt the German DIN 1988-3 (DIN 1988-300). Everything has been thought and re-thought about for the last 20-30 years.**

**Please submit your comments on this document to Standards Australia before the 15<sup>th</sup> December 2014 by using the following link:**

<https://hub.standards.org.au/hub/public/listOpenCommentingPublication.action>