



THE STANDARDS OF THE BRAZED ALUMINIUM PLATE-FIN HEAT EXCHANGER MANUFACTURERS' ASSOCIATION

Addendum to 4th Edition

September 2025

This document is updated periodically as an Addendum to the 4th Edition of the ALPEMA Standards. It contains a Clarification to the 4th Edition and Frequently Asked Questions (FAQs) which were developed by the ALPEMA members. This Addendum is published at the following web address.

<http://alpema.org/addendum>

Clarification to Section 4.10.2 of the 4th Edition

The ALPEMA members withdraw the italicized comment in the following sentence:

“Relief settings and relief capacities shall comply with the relevant governing Code and there is no need to account for interstream leakage due to the nature of the construction of brazed aluminium plate-fin heat exchangers.”

This sentence is replaced by the following:

“Relief settings and relief capacities shall comply with the relevant governing Code.”

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Answers to FAQs

1. What is the minimum temperature approach (pinch point) for a brazed aluminium plate-fin heat exchanger?

A good guideline is 1 to 3 K depending upon the application. Minimum temperature approaches even lower than 1 K are possible in a few applications.

2. Can a brazed aluminium plate-fin heat exchanger simply replace a conventional shell-and-tube heat exchanger?

Such replacement typically requires a deep look into the technical details. Materials, fouling, ability to clean, fluid compatibility, temperature differences, installation space, nozzle locations, support structures, etc., need to be checked. Adjustment of certain process parameters could become necessary. Typically shell-and-tube heat exchangers are operated with larger temperature differences, which could impact the mechanical integrity of the brazed aluminium plate-fin heat exchanger heat exchanger.

3. Are the ALPEMA Standards and API 668 the same?²

No, there are differences. See [ALPEMA responses to Requirements in API 668 Feb2022.pdf](#) based on the 3rd Edition of the ALPEMA Standards. The ALPEMA Standards 4th Edition was published in January 2024. API 668 2nd Edition is expected to be published by the end of 2025. ALPEMA will update the responses accordingly.

4. Can specifications for heat exchanger types such as shell-and-tubes or plate-and-frames be used for procurement of brazed aluminium plate-fin heat exchangers?

No. Additional information that may not be necessary for the procurement of other heat exchanger types is essential for brazed aluminium plate-fin heat exchangers, and must be provided. These include detailed material and process information. A typical specification sheet that illustrates the information necessary for brazed aluminium plate-fin heat exchangers is available for [download here](#).

² Changed May 2025



5. Are generic pressure vessel specifications applicable to brazed aluminium plate-fin heat exchangers or aluminium drums?

Not usually. Such specifications must be clearly restricted to carbon steel or stainless steel heat exchangers or drums if the requested supply contains such items.

6. Do generic welding specifications apply to brazed aluminium plate-fin heat exchangers?

No. Such specifications do not usually contain any reference to aluminium welding. Generic welding specifications must be restricted to carbon steel or stainless steel parts if the requested supply contains such items, and not used for aluminium welding.

7. What are the ALPEMA recommendations for brazed aluminium plate-fin heat exchanger-related relief valve sizing for fire conditions? More specifically, what can be assumed to be the “wetted surface” area of the heat exchanger exposed to fire, thus allowing estimation of the rate of vaporization of the fluids and the relief valve sizing?

As a simplified approach for the “wetted surface” of a brazed aluminium plate-fin heat exchanger, it is recommended to take into account, for each of the heat exchanger passes, the full outer surface of the heat exchanger (i.e. the 6 surfaces of the heat exchanger) and to ignore all heat exchanger internals. A fire protection layer, if any, is taken into account as well. These parameters can then be used to estimate the fire induced heat input and the rates of vaporization of the fluids, which are required to escape the brazed aluminium plate-fin heat exchanger through the relief valves.

8. What is ALPEMA’s opinion on the value of a hydrostatic test hold time of 1 hour?

Once a stream attains a hydrostatic test pressure, the length of time the test pressure is held does not affect the test result. Any test pressure that holds for 1 minute will hold for 1 hour. Rarely, during hydrostatic testing the stream test pressure is not reached due to leakage.

A 1-hour hold is performed on standard pressure vessels (shell-and-tube) where the hydrostatic test is both a structural test and a leak test. For liquid only applications, a hydrostatic leak test is appropriate. For brazed aluminium plate-fin heat exchangers a pneumatic leak test is performed after a hydrostatic structural test. A pneumatic leak test is more sensitive to detect leaks than a hydrostatic leak test. A pneumatic leak test will reveal leaks not indicated by a hydrostatic leak test.

Therefore, a 1-hour hold hydrostatic test costs time and money and does not improve leak detection nor improve structural integrity testing.

9. The 4th Edition updates the temperature rate of change for startup and shutdown from 2 °C/min to 5 °C/min. What is the basis for this change?

The maximum allowable temperature rate of change for infrequent events like startup and shutdown is increased from 2 °C/min to 5 °C/min based on plant data of existing units, subject to Sections 4.10 and 8.1 of the 4th Edition.



10. Does ALPEMA recommend installing piping to vent inactive areas (vent lines) to outside the insulation or cold box?

ALPEMA does not usually recommend the use of vent lines. Vent lines have the potential to seal inactive areas with moisture ingress.

If vent lines are installed, valves should not be installed in the vent line or any device that would potentially over pressurize the inactive area. Vent lines should extend outside the insulation and be covered in a manner that prevents moisture, water, and insect ingress while allowing the release of process streams in the event of leaks from adjacent active layers.

Brazed aluminum plate-fin heat exchangers may include unpressurized inactive areas equipped with vent and/or drain holes to prevent pressurization from leaks in adjacent active layers and allow means to detect such leaks. During shipping, handling, and storage, these vent and drain holes are sealed with vent covers to prevent the ingress of moisture, rainwater, insects, or debris. These vent covers should be used in accordance with the manufacturer's recommendation.

11. What is ALPEMA's recommended N₂ purge rate range for cold boxes in operation?

Manufacturers will recommend the purge rate, based on the free space inside the cold box. Any leakage from the cold box, and the daytime and nighttime atmospheric temperatures specified, may be considered.

A typical recommended minimum N₂ purge rate is one cold box free space volume per day and a maximum N₂ purge rate of twice that volume per day.

12. Does ALPEMA have an IOW for Brazed Aluminium Plate-Fin Heat Exchangers?⁴

There is a [link here](#) to ALPEMA's Integrity Operating Window document.

13. What does ALPEMA recommend for brazed aluminium plate-fin heat exchanger drying after a hydrostatic test at the OEM shop?

The ALPEMA standard does not describe details on operations like drying, welding or annealing where elevated temperature may occur but allows each member to determine suitable methods. Each member can comment on their manufacturing processes with respect to minimizing sensitization risk to the performance or durability of their product

14. What is the basis for the 0.1 µg/Nm³ mercury concentration limitation in Section 8.3.2 of the ALPEMA Standard? Because testing for these concentrations is difficult, should we apply additional margin or is that already "built-in"? Probably the ultimate question is, should we be worried if our testing shows 0.05 µg/Nm³, for example?

ALPEMA members evaluated the concerns of operations with mercury corrosion in brazed aluminum plate-fin heat exchangers decades ago and noted that operations with mercury guard beds did not appear to have mercury corrosion issues. Mercury guard bed capability at that time could reduce mercury concentrations down to 0.1 µg/Nm³. Thus, empirical evidence suggested natural gas with mercury concentrations at or below what mercury guard beds could remove

⁴ Added May 2025



appeared to be a reasonable limit for mercury concentration in a brazed aluminum plate fin heat exchanger. As with most industry organizations like the GPA and API, they adopted the ALPEMA standard recommendation as reasonable. Time moved on and mercury guard beds are currently capable of removing mercury to $0.01 \mu\text{g}/\text{Nm}^3$ concentration. The link between mercury guard bed capability and the $0.1 \mu\text{g}/\text{Nm}^3$ recommendation is not obvious now. In Section 8.3.2 of the ALPEMA Standard it is recommended that mercury guard beds be used for any concentration of mercury because the same gas field can sometimes contain large variations in mercury levels over time. In addition, the use of mercury tolerant features can be applied to further increase the safety margin against the risk of mercury induced corrosion damage.