Additional Information on the Proposed Methodology

"Introduction of cascade cooling system and temperature stratification tank at the beer factory"

1. Research on the COP values of brine chillers in Myanmar

1.1 Catalogue COP values

NH_3 is commonly used as refrigerant for industrial brine chillers for the cooling process with a large temperature difference between inlet brine and outlet brine in food/beverage factory. Although such chillers are usually designed for each client, and catalogs are not publicly available, a catalog of brine chillers was obtained from company A, a major manufacturer of brine chiller in Japan and Myanmar.

As a result, total 11 COP values of brine chillers ranging from 59.4 USRt to 518.1 USRt, provided with the same temperature conditions, are obtained.

1.2 Determination of the reference COP values

It is observed that the obtained COP values fall within a small range from 3.91 to 4.34 regardless of its capacity. Therefore, the most efficient COP, which has the largest value, is selected as the reference COP in a conservative manner and is shown in Table 1 below in red circles.

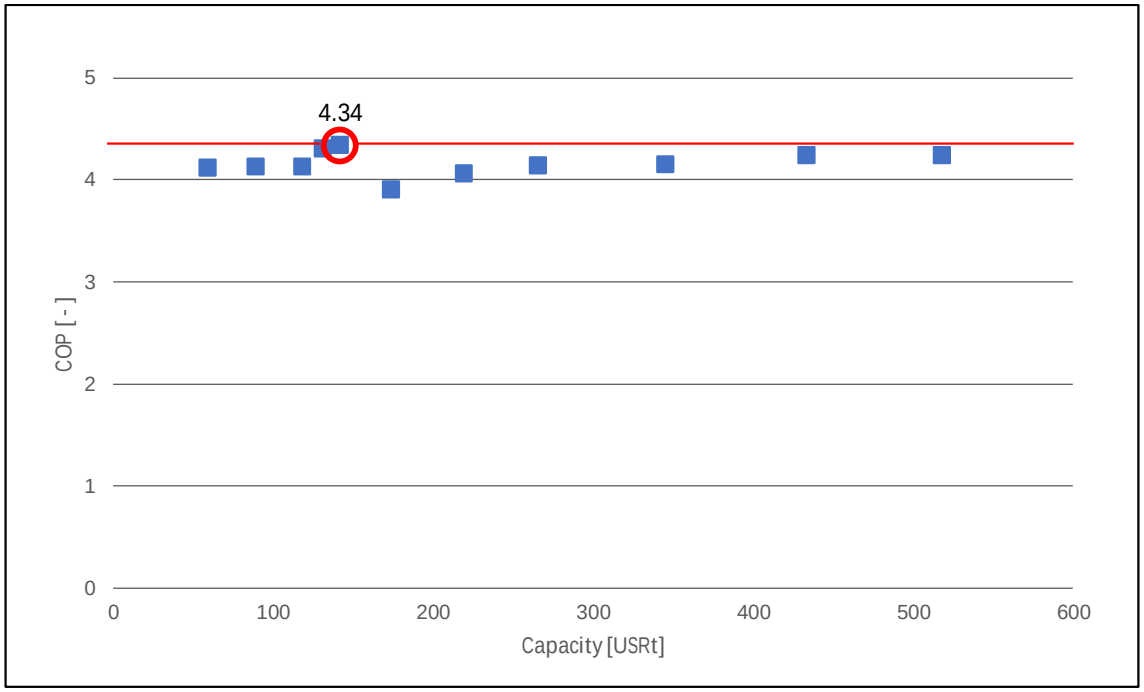

Figure 1: COP values of brine chiller marketed in Myanmar

The reference COP is determined and shown in Table 1 below.

Table 1: Established default $COP_{RE,i}$ for the proposed methodology

$COP_{RE,i}$ [-]	4.34