Brazer Test Certificate

Qualified in accordance with EN ISO 13585:2012

Company / Manufacturers Name:
Preferred Refrigeration Ltd

Brazer Name: **Adam Wolfe**
Assessor Name:
Alan Snelling / ~~Stephen Benton~~

Signed: *Alan Snelling*

Certificate No: CCLBRA1053
Small Commercial/Large Commercial SEP & Cat I Joints (delete as necessary)

BPS No: CCL/BRA 1

Brazing Process(s): Pipe to Pipe (site or workshop)

Date of Brazer Approval: 30/03/2023
Valid: 3 Years

Joints:
Type of Joint(S): Lap (tube insert)
Lap Length Range: See Table 1 below
Position Qualified: All

Flow Position:
Flow Position(s): Horizontal & Vertical up flow (max angular deviation +/- 15^{O})
Method of applying filler material:
Manual end feed by hand from rod

Base Metals:
Copper EN12735-1:2020
Steel ASTM A 106 grade B schedule 40 (machined)
Thickness Range:

¼"	22-15 SWG / n/a (SC/LC)
3/8"- 7/8"	22-15 SWG / Steel thickness 1.0mm to 4.0mm (SC/LC)
1-1/8"- 4-1/8"	20-9 SWG / Steel thickness 1.0mm to 4.5mm (LC)

Brazing Flux:
5% CuP - Self Fluxing
40% Ag or 56% Ag pre fluxed rod

EN1045

Filler Materials:
Copper to Copper: 5% CuP
Copper to Steel: 40% Ag or 56% Ag
EN ISO 3677
BS EN ISO 17672:2010

Post Braze Heat Treatment:
Copper to Copper: Cooled in still air
Copper to Steel: Cooled in still air + flux removal with damp cloth

Brazing Process / Temperature:
Flame Brazing (TB) Manual Torch
Oxy acetylene / propane 0.5 barg min pressure
Temp Range: >450^{O}C

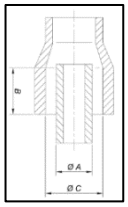
Technique:
Method of pre cleaning: Grit free abrasive sheet
Torch Nozzle Size: Sizes 5 – 25 including pepperpot
Internal OFN purging during brazing process to prevent oxidisation

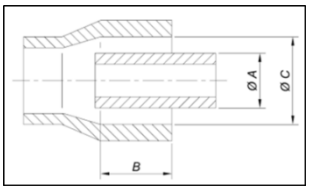
Clearance & Lap Tolerances – Table 1
Adapted from BS EN14276-1:2020

Imperial OD pipe sizes	Minimum overlap Cu / Cu (B), mm	Clearance (C-A), mm
1/4" 3/8" ½" 5/8" ¾" 7/8"	5	0.02 – 0.20
1-1/8" 1-3/8"	5	0.02 – 0.24
1-5/8" 2-1/8"	10	0.03 – 0.30
2-5/8" 3-1/8" 3-5/8" 4-1/8"	10	0.03 – 0.41

Imperial OD pipe sizes	Minimum overlap Cu / Fe or K65 (B), mm	Clearance (C-A), mm
1/4" 3/8" ½" 5/8" ¾" 7/8"	10	0.02 – 0.20
1-1/8" 1-3/8"	15	0.02 – 0.24
1-5/8" 2-1/8"	15	0.03 – 0.30
2-5/8" 3-1/8" 3-5/8" 4-1/8"	15	0.03 – 0.41

Diagram of Joint arrangement:





Confirmation of qualification by employer or other responsible person (every six months), required for the validity of this BPAR

Period from Approval	6 months	12 months	18 months	24 months	30 months
Date:					
Signature:					
Position or title:					

Test / Re Test Record

Range of Approval:

SC = Small Commercial - ¼" to 7/8"
LC = Large Commercial – 1-1/8" to 4-1/8"

Note: For full range approval ¼" to 4-1/8" all 8 joints SC/LC are required

Test 1		No Base metal degradation due to overheating	No lack of filler metal contour locally – un melted filler material around radius	No drop of filler Material – filler material not visible around radius	No excess of filler material	No flux & flux residue	Evidence of OFN purging	Metallographic Examination – 80% penetration, no cracks	Pass / Fail
Lap joint 1 - SC/LC	½" copper to ½" copper horizontal	✓	✓	✓	✓	✓	✓	✓	P
Lap joint 2 - SC/LC	½" copper to ½" copper vertical up flow	✓	✓	✓	✓	✓	✓	✓	P
Lap joint 3 - SC/LC	½" copper to ½" steel horizontal	✓	✓	✓	✓	✓	✓	✓	P
Lap joint 4 - SC/LC	½" copper to ½" steel vertical up flow	✓	✓	✓	✓	✓	✓	✓	P
Lap joint 5 – LC	1-1/8" K65 120 barg copper to 1-1/8" K65 120 barg copper horizontal	✓	✓	✓	✓	✓	✓	✓	P
Lap joint 6 – LC	1-1/8" K65 120 barg copper to 1-1/8" K65 120 barg copper vertical up flow	✓	✓	✓	✓	✓	✓	✓	P
Lap joint 7 – LC	1-1/8" K65 120 barg copper to 1-1/8" steel horizontal	✓	✓	✓	✓	✓	✓	✓	P
Lap joint 8 – LC	1-1/8" K65 120 barg copper to 1-1/8" steel vertical up flow	✓	✓	✓	✓	✓	✓	✓	P

Assessor Print:	Alan Snelling / ~~Stephen Benton~~	**Assessor Signed:** *Alan Snelling*	**Date: 30 / 03 / 2023**

Re-test	(if required)	No Base metal degradation due to overheating	No lack of filler metal contour locally – un melted filler material around radius	No drop of filler Material – filler material not visible around radius	No excess of filler material	No flux & flux residue	Evidence of OFN purging	Metallographic Examination – 80% penetration, no cracks	Pass / Fail
Lap joint 1 - SC/LC	½" copper to ½" copper horizontal								
Lap joint 2 - SC/LC	½" copper to ½" copper vertical up flow								
Lap joint 3 - SC/LC	½" copper to ½" steel horizontal								
Lap joint 4 - SC/LC	½" copper to ½" steel vertical up flow								
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Lap joint 6 – LC	1-1/8" K65 120 barg copper to 1-1/8" K65 120 barg copper vertical up flow								
Lap joint 7 – LC	1-1/8" K65 120 barg copper to 1-1/8" steel horizontal								
Lap joint 8 – LC	1-1/8" K65 120 barg copper to 1-1/8" steel vertical up flow								

Assessor Print:	Alan Snelling / ~~Stephen Benton~~	**Assessor Signed:** *Alan Snelling*	**Date: 30 / 03 / 2023**

BRA Brazer Procedure Specification (BPS)

Brazing procedures according to BS EN 14276-1:2020 SEP & Cat I Joints
Annex B - Specification & approval of brazing procedures

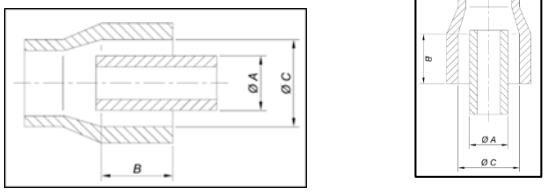
Company / Manufacturers Name: **Date:** Preferred Refrigeration Ltd 01/02/2021 **BPS No:** CCL/BRA 1 **Reference:** BPAR: BRA 2021 **Brazing Process(s):** Pipe to Pipe (site or workshop)	**Diagram of Joints:** 
Joints: **Type of Joint(S):** Lap (tube insert) **Lap Length Range:** See Table 1 below	**Flow Position:** Flow Position(s): Horizontal & Vertical up flow (max angular deviation +/- 15^{O}) **Method of applying filler material:** Manual end feed by hand from rod
Base Metals: Copper EN12735-1:2020 Steel ASTM A 106 grade B schedule 40 (machined) Thickness Range: ¼" 22-15 SWG / - (SC/LC) 3/8"- 7/8" 22-15 SWG / Steel thickness 1.0mm to 4.0mm (SC/LC) 1-1/8"- 4-1/8" 20-9 SWG / Steel thickness 1.0mm to 4.5mm (LC)	**Brazing Flux:** 5% CuP - Self Fluxing 40% Ag or 56% Ag pre fluxed rod EN1045
Filler Materials: Copper to Copper: 5% CuP Copper to Steel: 40% Ag or 56% Ag EN ISO 3677 BS EN ISO 17672:2010	**Post Braze Heat Treatment:** Copper to Copper: Cooled in still air Copper to Steel: Cooled in still air + flux removal with damp cloth
Brazing Process / Temperature: Flame Brazing (TB) Manual Torch Oxy acetylene / propane 0.5 barg min pressure Temp Range: >450^{O}C	**Technique:** Method of pre cleaning: Grit free abrasive sheet Torch Nozzle Size: Sizes 5 – 25 including pepperpot Internal OFN purging during brazing process to prevent oxidisation

Table 1

Imperial OD pipe sizes	Minimum overlap Cu / Cu (B), mm	Clearance (C-A), mm
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