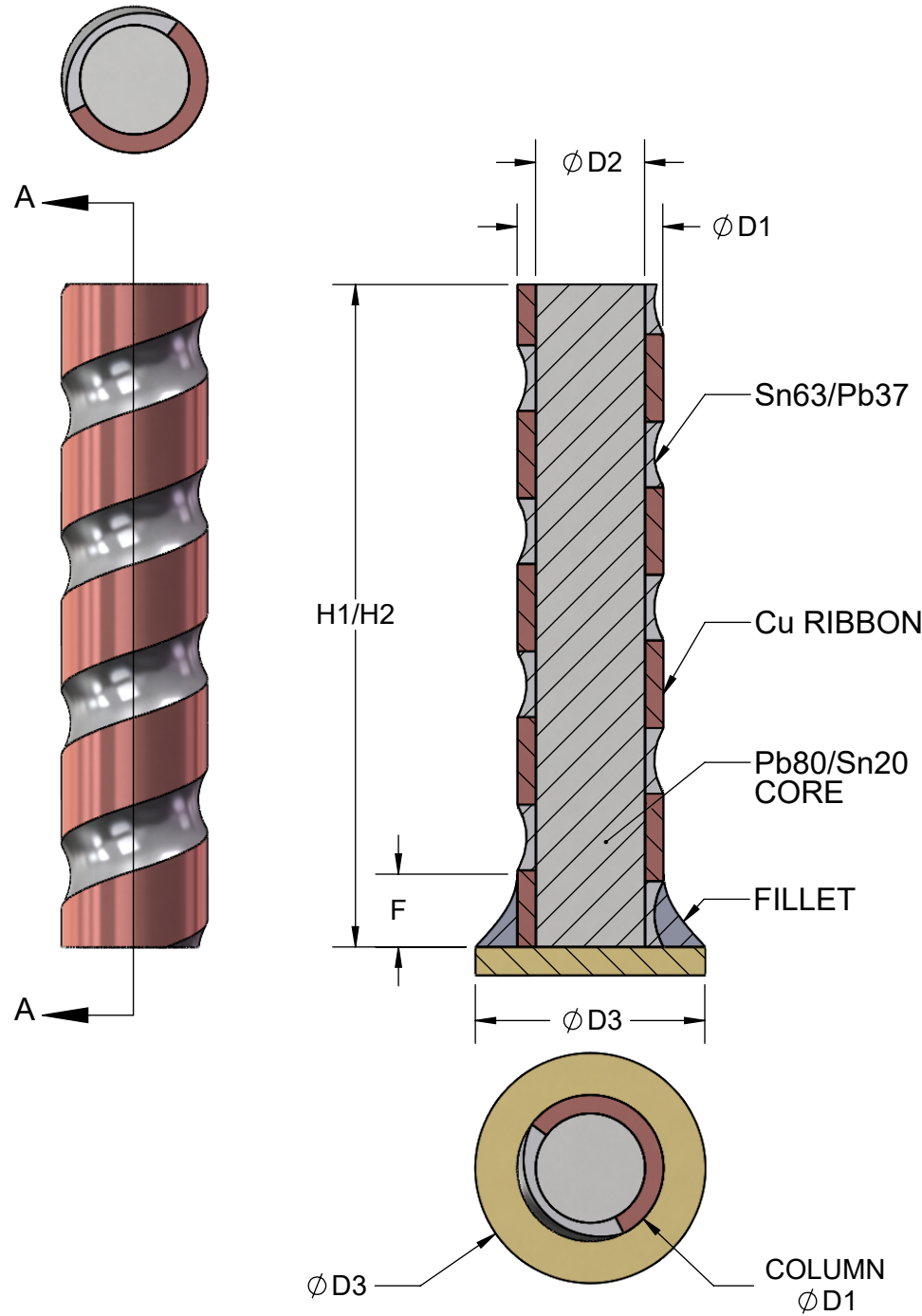


DIMENSION TABLE 1
PAD ϕ 0.86mm NOM

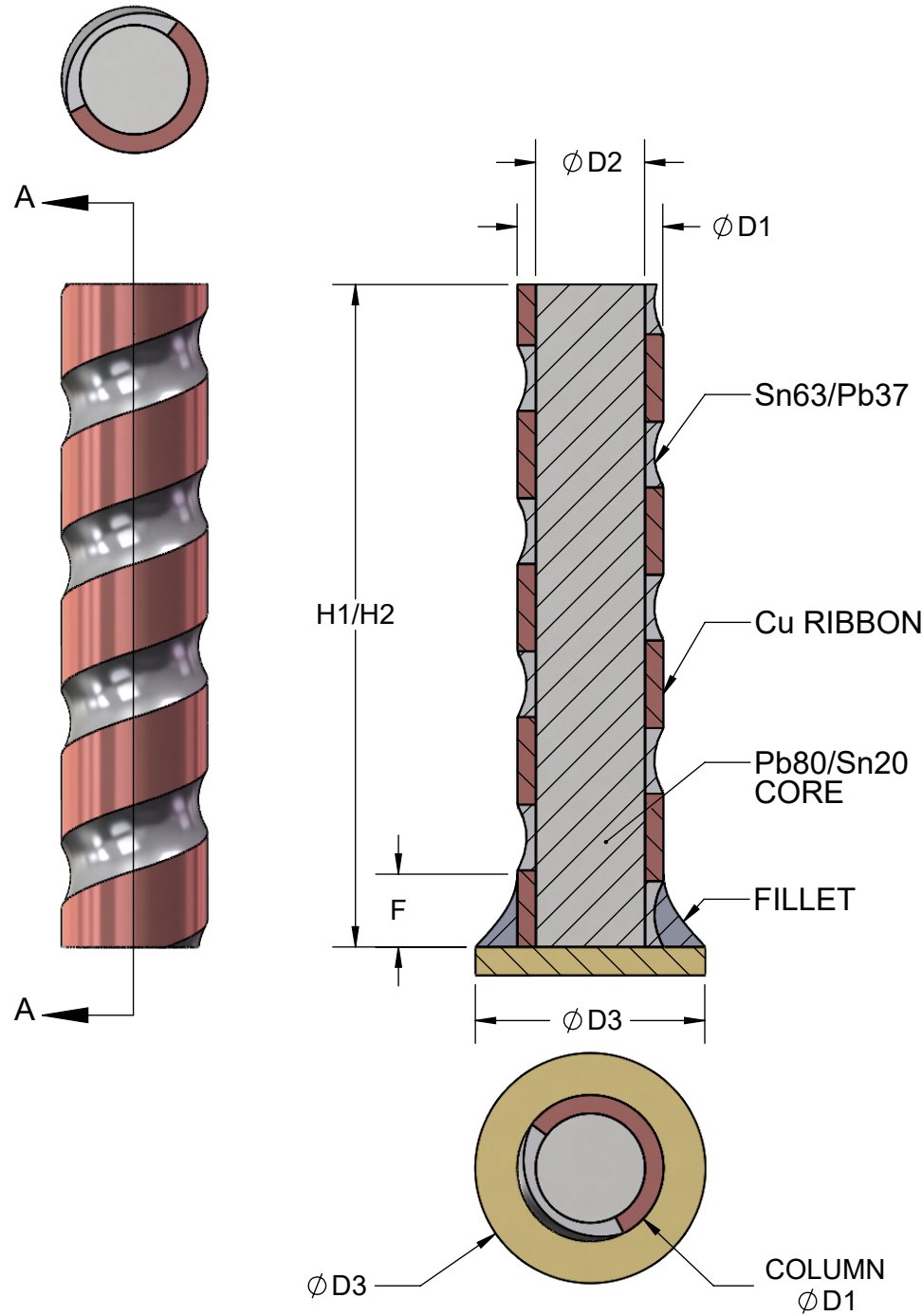


INCHES [mm]			
REF.	MIN.	NOM.	MAX.
D1	0.020 [0.51mm]	0.022 [0.56mm]	0.024 [0.61mm]
D2	0.017 [0.43mm]	0.018 [0.45mm]	-
D3	0.032 [0.81mm]	0.034 [0.86mm]	0.036 [0.91mm]
H1	0.083 [2.31mm]	0.087 [2.21mm]	0.091 [2.31mm]
H2	0.091 [2.31mm]	-	0.100 [2.54mm]
F	0.011 [0.28mm]	-	0.028 [0.71mm]

NOTES:
D1. MAJOR DIAMETER.
D2. MINOR DIAMETER.
D3. PAD DIAMETER.
H1. FINAL HEIGHT AFTER PLANARIZATION.
H2. INITIAL HEIGHT BEFORE PLANARIZATION.
F. FILLET HEIGHT.

APPROVALS	DATE	TopLine®			
DRAWN T. Au	11/8/2019				
ENG M. Hart	11/8/2019	TITLE SOLDER COLUMN CCGA SPECIFICATIONS			
MFG		SCALE	SIZE	DRAWING NO.	REV
QA		40:1	A	160000	A
CUST		DO NOT SCALE DRAWING			SHEET 1 OF 6
REVISED					

DIMENSION TABLE 2
PAD ϕ 0.80mm NOM

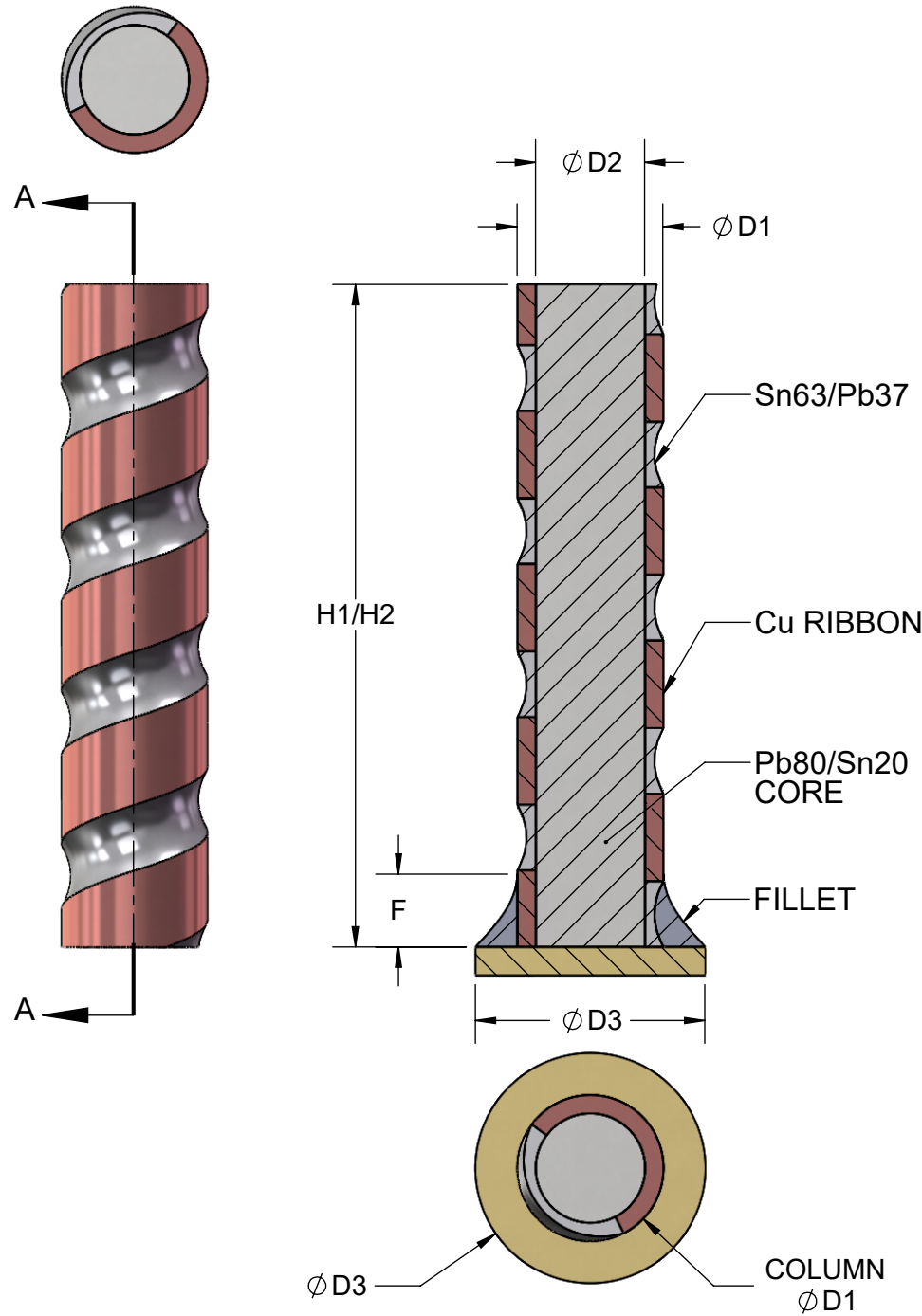


INCHES [mm]			
REF.	MIN.	NOM.	MAX.
D1	0.018 [0.46mm]	0.020 [0.51mm]	0.022 [0.56mm]
D2	0.015 [0.38mm]	0.016 [0.40mm]	-
D3	-	0.0315 [0.80mm]	-
H1	0.083 [2.11mm]	0.087 [2.21mm]	0.091 [2.31mm]
H2	0.091 [2.31mm]	-	0.100 [2.54mm]
F	0.010 [0.25mm]	-	0.028 [0.71mm]

NOTES:
D1. MAJOR DIAMETER.
D2. MINOR DIAMETER.
D3. PAD DIAMETER.
H1. FINAL HEIGHT AFTER PLANARIZATION.
H2. INITIAL HEIGHT BEFORE PLANARIZATION.
F. FILLET HEIGHT.

APPROVALS	DATE	TopLine®			
DRAWN T. Au	11/8/2019				
ENG M. Hart	11/8/2019	TITLE SOLDER COLUMN CCGA SPECIFICATIONS			
MFG		SCALE	SIZE	DRAWING NO.	REV
QA		40:1	A	160000	A
CUST		DO NOT SCALE DRAWING			SHEET 2 OF 6
REVISED					

DIMENSION TABLE 3
PAD ϕ 0.60mm NOM

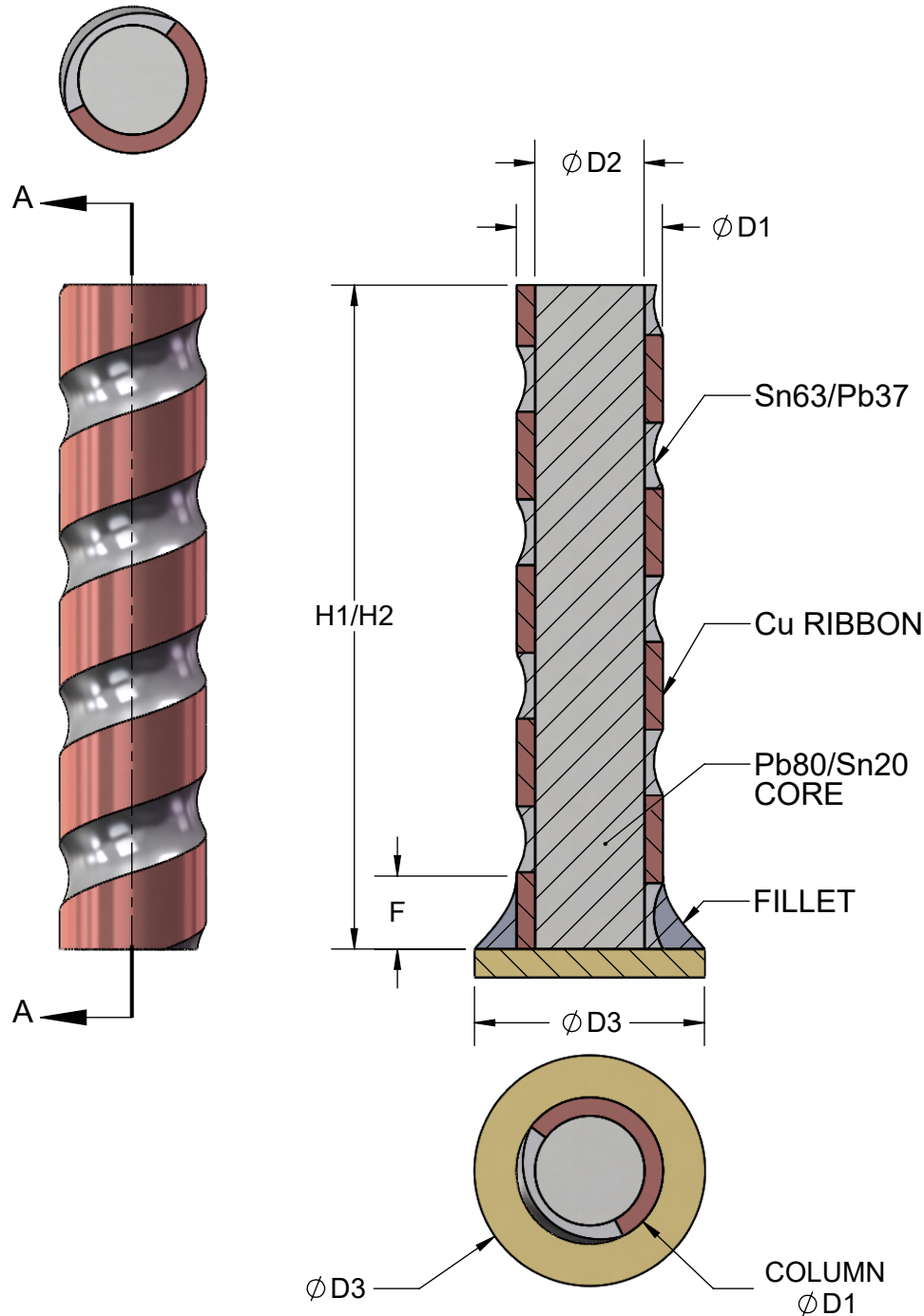


INCHES [mm]			
REF.	MIN.	NOM.	MAX.
D1	0.013 [0.33mm]	0.015 [0.38mm]	0.017 [0.43mm]
D2	0.010 [0.25mm]	0.012 [0.30mm]	-
D3	-	0.0236 [0.60mm]	-
H1	0.083 [2.11mm]	0.087 [2.21mm]	0.091 [2.31mm]
H2	0.091 [2.31mm]	-	0.100 [2.54mm]
F	0.0075 [0.19mm]	-	0.028 [0.71mm]

NOTES:
D1. MAJOR DIAMETER.
D2. MINOR DIAMETER.
D3. PAD DIAMETER.
H1. FINAL HEIGHT AFTER PLANARIZATION.
H2. INITIAL HEIGHT BEFORE PLANARIZATION.
F. FILLET HEIGHT.

APPROVALS	DATE	TopLine®			
DRAWN T. Au	11/8/2019				
ENG M. Hart	11/8/2019	TITLE SOLDER COLUMN CCGA SPECIFICATIONS			
MFG		SCALE	SIZE	DRAWING NO.	REV
QA		40:1	A	160000	A
CUST		DO NOT SCALE DRAWING			SHEET 3 OF 6
REVISED					

DIMENSION TABLE 4
PAD ϕ 0.50mm NOM

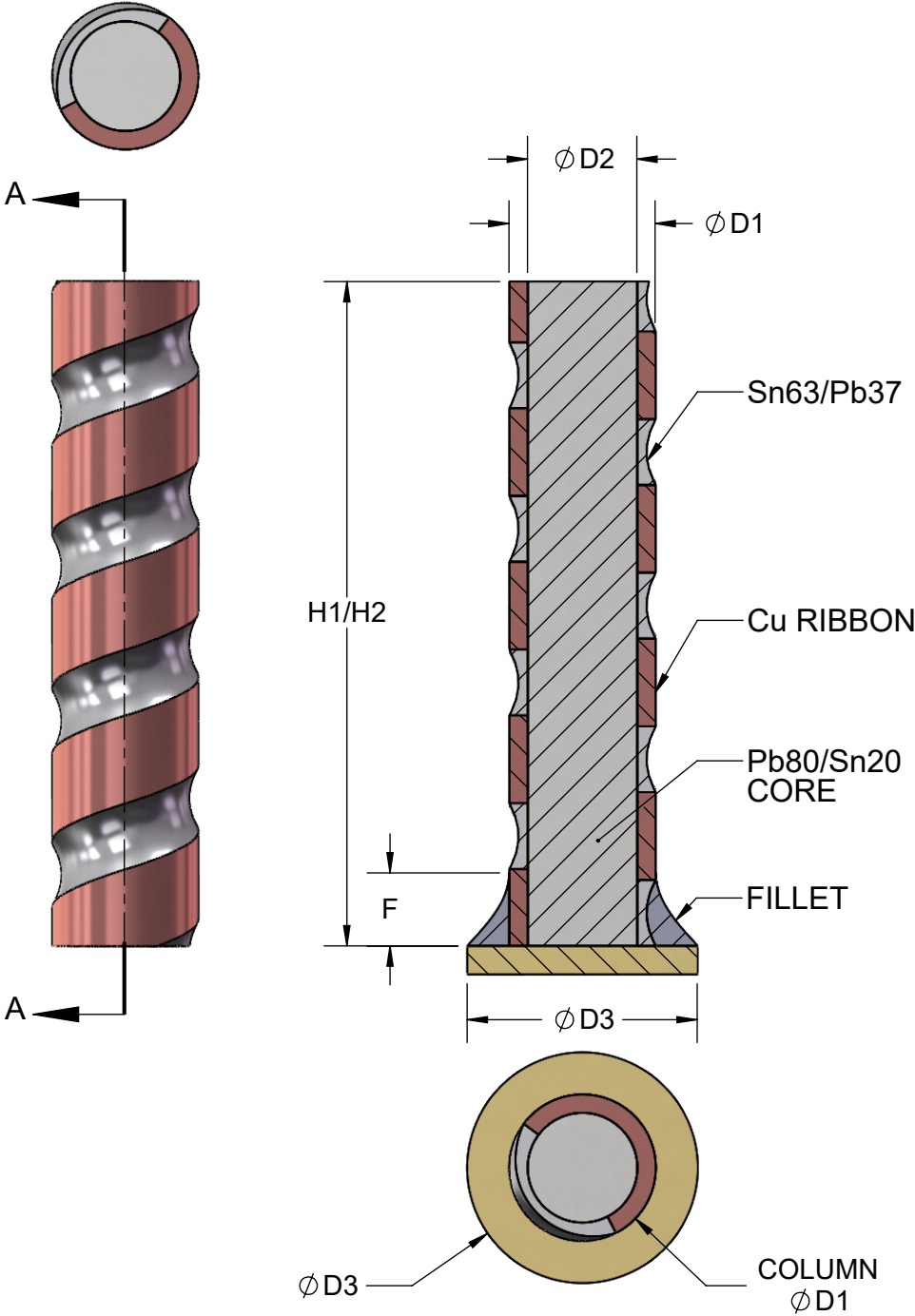


INCHES [mm]			
REF.	MIN.	NOM.	MAX.
D1	0.012 [0.30mm]	0.015 [0.38mm]	0.016 [0.40mm]
D2	0.010 [0.25mm]	0.012 [0.30mm]	-
D3	-	0.0197 [0.50mm]	-
H1	0.083 [2.11mm]	0.087 [2.21mm]	0.091 [2.31mm]
H2	0.091 [2.31mm]	-	0.100 [2.54mm]
F	0.0075 [0.19mm]	-	0.028 [0.71mm]

NOTES:
D1. MAJOR DIAMETER.
D2. MINOR DIAMETER.
D3. PAD DIAMETER.
H1. FINAL HEIGHT AFTER PLANARIZATION.
H2. INITIAL HEIGHT BEFORE PLANARIZATION.
F. FILLET HEIGHT.

APPROVALS	DATE	TopLine®			
DRAWN T. Au	11/8/2019				
ENG M. Hart	11/8/2019	TITLE SOLDER COLUMN CCGA SPECIFICATIONS			
MFG		SCALE	SIZE	DRAWING NO.	REV
QA		40:1	A	160000	A
CUST		DO NOT SCALE DRAWING			SHEET 4 OF 6
REVISED					

**DIMENSION TABLE)
PAD ϕ 0.' , mm NOM**



INCHES [mm]			
REF.	MIN.	NOM.	MAX.
D1	0.009 [0.23mm]	0.010 [0.25mm]	0.011 [0.28mm]
D2	0.008 [0.20mm]	0.009 [0.23mm]	-
D3	-	0.0150 [0.38mm]	-
H1	0.050 [1.27mm]	0.060 [1.52mm]	0.070 [1.78mm]
H2	0.060 [1.52mm]	-	0.087 [2.21mm]
F	0.005 [0.125mm]	-	0.020 [0.51mm]

NOTES:
D1. MAJOR DIAMETER.
D2. MINOR DIAMETER.
D3. PAD DIAMETER.
H1. FINAL HEIGHT AFTER PLANARIZATION.
H2. INITIAL HEIGHT BEFORE PLANARIZATION.
F. FILLET HEIGHT.

APPROVALS	DATE	TopLine®			
DRAWN T. Au	11/8/2019				
ENG M. Hart	11/8/2019	TITLE SOLDER COLUMN CCGA SPECIFICATIONS			
MFG		SCALE	SIZE	DRAWING NO.	REV
QA		40:1	A	160000	A
CUST		DO NOT SCALE DRAWING			SHEET 5 OF 6
REVISED					

REFER TO MIL-STD-883 REV L

3.3.6 Ball/column grid array leads.

- a. Nonconformance with any design criteria (see 3.3.1.c).
- b. Solder columns / solder balls alignment.
 - i. Solder column base is misaligned such that the column is not within the perimeter of the pad.
 - ii. Solder column tip misalignment that does not meet drawing requirements (typically < 100 μm).
 - iii. Solder ball misalignment that does not meet drawing requirements.
- c. Broken, twisted or damaged solder columns/spheres. Damaged columns/spheres (scored, gouged) that fail to meet final dimensional requirements.
- d. Solder column bends or misalignments that do not meet the drawing design criteria.
- e. Solder columns/spheres containing any void, hole, pit, gouge or depression greater than 15% of the column/sphere diameter or volume. For voids, holes, pits less than 15% of the diameter or volume, the cumulative total shall be less than half of the column/sphere diameter.
- f. Solder columns/spheres containing cracks.
- g. Columns/spheres with burrs or bumps exceeding 20% of the column/sphere diameter.
- h. Columns/spheres that exhibit peeling, flaking, or blistering.
- i. Solder fillet height which is less than half the column diameter for more than 25% of the column circumference.
- j. For copper reinforced columns that exhibit any of the following:
 - i. Copper ribbon delamination exceeding 25% around the column circumference.
 - ii. Columns with copper wire having copper exposed more than five percent of the column surface area. Exposed (cut) copper on the free end of the column is acceptable.
- k. Discoloration of columns/spheres due to corrosion, crusting, or residual flux (there should be a consistent shiny solder appearance). Evidence of flux residue, stains, rust, or signs of corrosion that can be seen at 3 to 10X magnification.
- l. Foreign material. Discoloration, or adherent deposits within 0.5 mm of the free end of the column.
- m. Solder columns/spheres that do not meet requirements for device co-planarity/uniformity of the drawing design criteria (typically < 150 μm).
- o. Pad dewetting/non-wetting greater than 5% of the pad surface area.

TopLine[®]

TITLE				SOLDER COLUMN CCGA SPECIFICATIONS			
SCALE	SIZE	DRAWING NO.		REV			
NONE	A	160000		A			
DO NOT SCALE DRAWING				SHEET 6 OF 6			