

<b>Mobile Climate Control Global Engineering Requirement</b>	No: 57-00583      Rev. F      Date: 08/15/07	
	Auth. No. 72N001GP07 SHT. 73	Page 1 of 5
Title: <b>DRAWING INTERPRETATION (Fabricated Parts &amp; Assemblies)</b>	Supersedes: 57-00583 Rev E	
		Date: 02/20/06 Page 1 - 5

#### 1.0 PURPOSE:

This Engineering Requirement was developed to enhance the interpretation of MCC global drawings for fabricated sheet metal, round tubing (i.e. copper, steel, aluminum etc.) piece parts and various separable and inseparable assembly drawings. Since design personnel follow many Drafting Standards during the process of preparing drawings, it was deemed necessary to provide a condensed version of highlights from those standards to aid in understanding drawing content and design intent.

#### 2.0 SCOPE:

The requirements contained in this document are applicable to all MCC global drawings that specify Engineering Requirement 57-00583-00.

#### 3.0 GENERAL DRAWING INTERPRETATIONS:

- 3.1 Refer to the drawing format to determine the part's unit of design measurement and projection angle (i.e. 1st. or 3rd. angle).
- 3.2 Fabricated parts described on MCC global drawings are dual dimensioned in Inches and Millimeters. The conversion dimension is always displayed in [brackets]. Example: 1.00 [25.4]
- 3.3 Dimensions shown in (Parenthesis) are for information only and not subject to tolerance or inspection criteria.
- 3.4 Critical Characteristics, Functional Requirements and Process Requirements will be clearly specified on the drawing in accordance with MCC Drafting Standard 13.94.
- 3.5 Notes on drawings typically provide instructions for process steps or assembly information.
- 3.6 Assembly drawings with non-integral bills of material contain the statement "SEE SEPARATE PARTS LIST" above the title block. The statement means the bill of material is controlled by another software system (e.g. Parts Lister, 4<sup>th</sup> Shift etc.)
- 3.7 Part call outs on assembly drawings are depicted with items numbers in balloons that match corresponding item numbers on the mating bill of material.
- 3.8 A subset number adjacent to the outside of a balloon callout indicates the quantity of the item number required at that location. If a balloon callout does not have a subset number adjacent to the balloon this indicates a quantity of one.
- 3.9 Balloon call outs on charted assembly drawings will sometimes include additional information (e.g. - 00 & -01 only) to further clarify intent for specific assembly configuration(s).

#### 4.0 SHEET METAL PART REQUIREMENTS AND DRAWING INTERPRETATIONS:

- 4.1 Parts must be free of burrs and sharp edges.
- 4.2 Material surfaces, part features and centerlines not dimensioned and shown either perpendicular or parallel to each other are implied to be at 90° or 180° apart respectively.
- 4.3 Dimensional tolerances are defined in the title block, unless otherwise specified on the drawing.
- 4.4 The sheet metal thickness tolerance is controlled within the material specification number shown on the drawing or parts list.
- 4.5 Equal alternate inch or metric punch tooling for clearance holes may be used during the fabrication process as specified in Chart 1. For the purpose of this Engineering Requirement, any "inch" diameter hole with a +/- .005 tolerance or "metric" diameter hole with a +.2/-0 mm tolerance is defined as a clearance hole. Chart 1 does not apply to engagement holes for tap drills, weld nuts, rivnuts, press nuts, press studs etc. Tolerances for engagement holes are normally specified as part of the hole diameter dimension call out rather than a general tolerance in the drawing title block. Similarly, Chart 2 describes the equal alternate inch or metric punch tooling for obround holes commonly referred to as slots. A slot is considered to be a clearance hole therefore the same rules apply.
- 4.6 To prevent material cracking, bend relief holes are to be sized and configured per MCC Manufacturing Specification 47-915, unless otherwise specified.

File: this file is located on the Syracuse Server L:\Drafting\drawings	Prepared By: <b>V. Green</b>	Approved By: <b>N. Rizzo</b>	Date: <b>08/15/07</b>
---	------------------------------	------------------------------	-----------------------

<b>Mobile Climate Control</b> <b>Global Engineering Requirement</b> Title: <b>DRAWING INTERPRETATION</b> <b>(Fabricated Parts &amp; Assemblies)</b>	No: 57-00583      Rev. F      Date: 08/15/07	
	Auth. No. 72N001GP07 SHT. 73	Page 2 of 5
	Supersedes: 57-00583 Rev E	Date: 02/20/06 Page 1 - 5

4.0 continued:

4.7 Inside bend radius is specified on the part drawing.

4.8 Parts must be clean and free of contaminants.

Round Clearance Hole Tooling - Cross Reference					
Metric Hole Diameter			Recommended Alternate Inch Tooling		Nominal Difference
mm+/-2/-0	nom. [inch]	[tol. Inch]	inch +/-0.005	Toleranced	
3.5	0.138	.138/.146	0.136	.131/.141	-0.002
4	0.157	.157/.165	0.156	.151/.161	-0.001
4.5	0.177	.177/.185	0.172	.167/.177	-0.005
5	0.197	.197/.205	0.201	.196/.206	0.004
			0.203	.199/.209	0.006
5.5	0.217	.217/.225	0.219	.214/.224	0.002
6	0.236	.236/.244	0.250	.245/.255	0.014
7	0.276	.276/.284	0.281	.276/.286	0.005
8	0.315	.315/.323	0.312	.307/.317	-0.003
9	0.354	.354/.362	0.375	.370/.380	0.021
10	0.394	.394/.402	0.406	.401/.411	0.012
			0.400	.395/.405	0.006
			0.398	.393/.403	0.004
11	0.433	.433/.441	0.437	.432/.442	0.004
12	0.472	.472/.480	0.469	.464/.474	-0.003
13	0.512	.512/.520	0.516	.511/.521	0.004
13.5	0.531	.531/.539	0.531	.526/.536	0.000
			0.540	.535/.545	0.009
14	0.551	.551/.559	0.562	.557/.567	0.011
15	0.591	.591/.599	0.594	.589/.599	0.003
15.5	0.610	.610/.618	0.625	.620/.630	0.015
16	0.630	.630/.638	0.625	.620/.630	-0.005
17.5	0.689	.689/.697	0.688	.683/.693	-0.001
19	0.748	.748/.756	0.750	.745/.755	0.002
20	0.787	.787/.795	0.784	.779/.789	-0.003
			0.781	.776/.786	-0.006
22	0.866	.866/.874	0.875	.870/.880	0.009
23	0.905	.905/.913	0.906	.901/.911	0.001
24	0.945	.945/.953	0.938	.933/.943	-0.007
25	0.984	.984/.992	1.000	.995/1.005	0.016
26	1.024	1.024/1.032	1.031	1.026/1.036	0.007
			1.015	1.010/1.020	-0.009
27	1.063	1.063/1.071	1.062	1.057/1.067	-0.001
35	1.378	1.378/1.386	1.375	1.370/1.380	-0.003
38	1.496	1.496/1.504	1.500	.1495/1.505	0.004

Chart 1

File: this file is located on the Syracuse Server L:\Drafting\drawings	Prepared By: <b>V. Green</b>	Approved By: <b>N. Rizzo</b>	Date: <b>08/15/07</b>
---	------------------------------	------------------------------	-----------------------

<b>Mobile Climate Control</b> <b>Global Engineering Requirement</b> Title: <b>DRAWING INTERPRETATION</b> <b>(Fabricated Parts &amp; Assemblies)</b>	No: 57-00583      Rev. F      Date: 08/15/07	
	Auth. No. 72N001GP07 SHT. 73	Page 3 of 5
	Supersedes: 57-00583 Rev E	Date: 02/20/06 Page 1 - 5

Obround (Slot) Tooling - Cross Reference									
Metric Slot Size & Conversion Dimensions					Alternate Inch Slot Tooling				
mm+.2/-0	nom. [inch]			[tol. Inch]	inch +/- .005			Nominal Difference	
	W	x	L		W	x	L	W	x L
					0.031	x	0.625		x
							0.500		x
					0.062	x	1.000		x
					0.093	x	0.500		x
							0.375		
3 x 12	0.118	x	0.472	.118/.126 x .472/.480	0.125	x	0.500	0.007	x
							0.562		
3 x 18		x	0.708	.118/.126 x .708/.716			0.750		
							1.000		
							1.500		
3.5 x 6	0.138	x	0.236	.138/.146 x .236/.244	0.141	x	0.250	0.003	x 0.014
4 x 12	0.157	x	0.472	.157/.165 x .472/.480	0.156	x	0.500	-0.001	x 0.028
					0.187	x	0.375		x
							0.312		
5 x 10	0.197	x	0.394	.197/.205 x .394/.402	0.203	x	0.345	0.006	x
							0.500		
							0.687		
							0.312		
5.5 x 12	0.217	x	0.472	.217/.225 x .472/.480	0.218	x	0.500	0.001	x 0.028
							0.625		
5.5 x 11		x	0.433	.217/.225 x .433/.441	0.220	x	0.440	0.003	x 0.007
6 x 8	0.236	x	0.315	.236/.244 x .315/.323	0.250	x	0.312	0.014	x
6 x 9		x	0.354	.236/.244 x .354/.362			0.375		
6 x 11		x	0.433	.236/.244 x .433/.441			0.437		
6 x 12		x	0.472	.236/.244 x .472/.480			0.500		
6 x 25		x	0.984	.236/.244 x .984/.992			1.000		
6 x 50		x	1.968	.236/.244 x 1.968/1.976			2.000		
							0.440		
	0.276				0.281	x	0.500	0.005	x
7 x 14		x	0.551	.276/.284 x .551/.559			0.562		
							0.500		
8 x 12	0.315	x	0.472	.315/.323 x .472/.480	0.312	x	0.625	-0.003	x
8 x 16		x	0.630	.315/.323 x .630/.638			1.000		
8 x 25		x	0.984	.315/.323 x .984/.992			1.125		
							3.000		
9 x 12	0.354	x	0.472	.354/.362 x .472/.480	0.375	x	0.500	0.021	x
9 x 16		x	0.630	.354/.362 x .630/.638			0.625		
9 x 18		x	0.709	.354/.362 x .709/.717			0.750		
9 x 25		x	0.984	.354/.362 x .984/.992			1.000		
9 x 38		x	1.496	.354/.362 x 1.496/1.504			1.500		
							1.750		
							3.500		
					0.406	x	2.000		x
11 x 22	0.433	x	0.866	.433/.441 x .866/.874	0.437	x	0.875	0.004	x 0.009
11 x 38		x	1.496	.433/.441 x 1.496/1.504			1.500		
13 x 16	0.511	x	0.630	.511/.519 x .630/.638	0.500	x	0.625		
14 x 19	0.551	x	0.748	.551/.559 x .748/.756	0.562	x	0.750	0.011	x 0.002

**Chart 2**

File: this file is located on the Syracuse Server L:\Drafting\drawings	Prepared By: <b>V. Green</b>	Approved By: <b>N. Rizzo</b>	Date: <b>08/15/07</b>
--	------------------------------	------------------------------	-----------------------

<b>Mobile Climate Control</b> <b>Global Engineering Requirement</b> Title: <b>DRAWING INTERPRETATION</b> <b>(Fabricated Parts &amp; Assemblies)</b>	No: 57-00583      Rev. F      Date: 08/15/07	
	Auth. No. 72N001GP07 SHT. 73	Page 4 of 5
	Supersedes: 57-00583 Rev E	Date: 02/20/06 Page 1 - 5

4.0 continued:

4.9 After shearing, punching and forming processes, finished sheet metal parts shall conform to the flatness tolerances specified in Chart 3, unless otherwise specified on the part drawing.

Flatness Tolerance - Sheet Metal Piece Parts				
Material Type	Carrier Transicold TMW Material Specification	Old Material Specification	Material Thickness Range	Tolerance in Inches / ft of Length or Width
Aluminum	57-00614	3003-H14	.020 - .064	0.023
Aluminum	57-00614	3003-H14	.065 - .249	0.039
Aluminum	57-00614	3003-H14	.250 - .624	0.063
Aluminum	57-00632	5052-H32	.020 - .064	0.039
Aluminum	57-00632	5052-H32	.065 - .249	0.047
Aluminum	57-00632	5052-H32	.250 - .624	0.063
Min Spangled Steel	57-00656	VA03-56	Up to .048	0.078
Min Spangled Steel	57-00656	VA03-56	Over .048	0.047
Hot Rolled Steel	57-00612	VA03- 8 & 12	.057 - .179	0.063
Hot Rolled Steel	57-00612	VA03-8 & 12	.180 - .230	0.063
Hot Rolled Steel	57-00612	ASTM-A36	.250 - .374	0.078
Hot Rolled Steel	57-00612	ASTM-A36	.375 - .499	0.070
Cold Rolled Steel	57-00634	VA03-8 & 14	Up to .044	0.078
Cold Rolled Steel	57-00634	VA03-8 & 14	.045 - .135	0.047
Cold Rolled Steel	57-00634	VA03-8 & 14	.164 - .249	0.094
Stainless Steel	57-00630	VN04-3	Up to .062	0.094
Stainless Steel	57-00630	VN04-3	.062 - .1875	0.063
Galvannealed Steel	57-00673	VA03-40	Up to .048	0.078
Galvannealed Steel	57-00673	VA03-40	Over .048	0.047

**Chart 3**

## 5.0 TUBING PART REQUIREMENTS AND DRAWING INTERPRETATIONS:

- 5.1 All tubes must be free of burrs, dirt, oil and other contaminants that would prevent a proper braze or weld joint. Refrigerant tubes (i.e. copper & steel) must also be free of obstructions which would hinder refrigerant flow.
- 5.2 Refrigerant tubes must not exceed the contamination limits of MCC Corporation Engineering Requirement Z-293.
- 5.3 Dimensional tolerances are defined in the title block, unless otherwise specified on the drawing.
- 5.4 Tolerance on the tube; outside diameter, wall thickness, inside diameter and roundness are controlled within the material specification number shown on the drawing or parts list.
- 5.5 Finished bent refrigerant tubes must meet the quality requirements of MCC Corporation Engineering Requirement Number B-247. Material surfaces, part features and centerlines not dimensioned and shown either perpendicular or parallel to each other are implied to be at 90° or 180° apart respectively.
- 5.6 Centerline bend radius is specified on the part drawing.

File: this file is located on the Syracuse Server L:\Drafting\drawings	Prepared By: <b>V. Green</b>	Approved By: <b>N. Rizzo</b>	Date: <b>08/15/07</b>
--	------------------------------	------------------------------	-----------------------

<b>Mobile Climate Control</b> <b>Global Engineering Requirement</b>	No: 57-00583      Rev. F      Date: 08/15/07	
	Auth. No. 72N001GP07 SHT. 73	Page 5 of 5
Title: <b>DRAWING INTERPRETATION</b> <b>(Fabricated Parts &amp; Assemblies)</b>	Supersedes: 57-00583 Rev E	
		Date: 02/20/06 Page 1 - 5

## 6.0 WELDMENT REQUIREMENTS & DRAWING INTERPRETATIONS:

When welded assemblies are purchased from an outside supplier in lieu of being manufactured internally to MCC, then the following requirements are invoked in addition too any stated within the drawing document.

6.1 Welding symbols described on the drawing are shown in accordance with standards set forth in the American Welding Society specification, AWS 2.4 or International Standard ISO 2553, latest versions.

6.2 Completed weld assemblies must be free of all weld scale and weld spatter.

6.3 Completed weld assemblies must be square within the overall tolerances specified on the drawing.

6.4 If no specific dimension or tolerance for controlling weld distortion is stated on the drawing, then such distortion should be held to a minimum. Suppliers should contact MCC purchasing department for further direction, if there are any questions or concerns with the finished part.

## 7.0 PAINTED PART REQUIREMENTS:

When painted parts are purchased from an outside supplier in lieu of being painted internally at MCC, then the following requirements are invoked in addition too any stated within the drawing document.

7.1 Prior to paint, parts must be metal finished to remove all gross defects, burrs and scratches. In addition, the threaded portion of all fasteners shall be protected from the paint process.

7.2 Paint application characteristics must meet the requirements specified on the MCC paint drawing called for in each part's bill-of-material (e.g. 36-00048) and Engineering Requirement 57-00627, Powder Paint Specification for MCC Product Applications.

## 8.0 ADDITIONAL REQUIREMENTS FOR OUTSIDE CTD SUPPLIERS:

When fabricated sheet metal and tubing parts are purchased from an outside supplier in lieu of being manufactured internally at MCC; then the requirements specified in 8.1, 8.2 and 8.3 are applicable in addition to requirements 3.0 through 7.0 stated above.

8.1 Marking: MCC part number must be marked on the shipping container. In addition, for parts that are exported to the U.S., the part shipping container must be marked in accordance with U.S. Code of Federal Regulations (CFR) 19-S, Part 134, Country of Origin Marking Requirements.

8.2 Packaging: Must be adequate to protect parts from shipping damage, dirt and corrosive elements. All wood packaging materials used for International trade must comply with ISPM #15 of the International Plant Protection Convention.

8.3 No deviation from the construction defined by an approved sample or detailed specification (on file in Mobile Climate Control Division's Engineering Department) will be made without approval from Mobile Climate Control Division's Purchasing Department.

8.4 The Supplier is required to comply with MCC Engineering Requirement 57-00765, Materials of Concern, supplier criteria for identification & elimination.

Revised

New

File: this file is located on the Syracuse Server L:\Drafting\drawings	Prepared By: <b>V. Green</b>	Approved By: <b>N. Rizzo</b>	Date: <b>08/15/07</b>
--	------------------------------	------------------------------	-----------------------