



August 12, 1999

Mr. Steve Copp  
Plenums Plus  
67 Brisbane Street  
Chula Vista, CA 91910-1065

Subject: Shop Standards Verification

Dear Mr. Copp:

Your recent application to the SMACNA Testing & Research Institute for Verification of the Plenums Plus Rectangular Duct Construction Shop Standards has been completed.

The Institute is pleased to announce that the attached Shop Standards (1/2" - 4" w.g.) have been verified to be in compliance with the 1995 SMACNA HVAC Duct Construction Standards - Metal & Flexible, 2<sup>nd</sup> Edition, 4th Printing - November 1998.

The Institute has affixed a stamp of verification to each of your Shop Standards submitted as verification of compliance.

Sincerely,

A handwritten signature in black ink that reads "Dennis M. Bradshaw".

Dennis M. Bradshaw  
Executive Director

DMB/dd

Enclosure

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# PLENUMS + Sheet Metal Fabrication

1/2" WG	POS OR NEG	<b>1995 SMACNA SHOP STANDARDS FOR RECTANGULAR DUCT CONSTRUCTION</b>												
		JOINTS				JOINT TIE RODS			LONG SEAM TYPE	INTERMEDIATE REINFORCEMENT				REMARKS
		DUCT DIMENSION	PANEL GA	TYPE	SIZE	GA.	SPACE	TYPE		POS. SIZE	NEG. SIZE	TYPE	POSITIVE SIZE	
		1	2		3	4	5	6	7	8	9	10	11	
8-DOWN	26	S&D	1"	24	5'-0"				L-2					
9-10	26	S&D	1"	24	5'-0"				L-2					
11-12	26	S&D	1"	24	5'-0"				L-2					
13-14	26	S&D	1"	24	5'-0"				L-2					
15-16	26	S&D	1"	24	5'-0"				L-2					
17-18	26	S&D	1"	24	5'-0"				L-2					
19-20	26	SS&D	1"	26	5'-0"				L-2					
21-22	26	SS&D	1"	26	5'-0"				L-2					
23-24	26	SS&D	1"	26	5'-0"				L-2					
25-26	26	SS&D	1"	24	5'-0"				L-2					
27-28	26	SS&D	1"	24	5'-0"				L-2					
29-30	26	SS&D	1"	24	5'-0"				L-2					
31-36	26	SS&D	1"	24	5'-0"				L-2					
37-42	26	TDF	1-3/8"	26	5'-0"				L-2					
43-48	24	TDF	1-3/8"	24	5'-0"				L-2					
49-54	24	TDF	1-3/8"	24	5'-0"				L-1					
55-60	24	TDF	1-3/8"	24	5'-0"				L-1					
61-72	22	TDF	1-3/8"	22	5'-0"				L-1					
73-84	22	TDF	1-3/8"	22	5'-0"				L-1	1-MPT	1/2" EMT	SEE TABLE	2'-6"	
85-96	22	TDF	1-3/8"	22	5'-0"				L-1	1-MPT	1/2" EMT	SEE TABLE	2'-6"	
97-108	18	TDF	1-3/8"	18	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	N/A	N/A	N/A	N/A	
109-120	18	TDF	1-3/8"	18	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	A	H -1-1/2 X 3/16	H -2 X 1/8	2'-6"	

## NEGATIVE PRESSURE EMT CONDUIT REINFORCING TABLE

EMT DIAMETER	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
EMT LENGTH	UP TO 46"	47" TO 62"	63" TO 74"	75" TO 96"	97" TO 118"	119" TO 120"

1) Indicates Joint type from fig. 1-4.

2) Indicates joint size.

3) Indicates spacing between joints.

4) Indicates type tie rod used for fig. 1-3D.

5) Indicates size tie rod for pos. pressure per DCS spec. S1.19.4.

6) Indicates size tie rod for neg. pressure per DCS table 1-18.

7) Indicates longitudinal seam from DCS 1-5 (L-1=Pittsburgh; L-2= snaplock).

8) Indicates intermediate reinforcement type.

(A= angle; TR= tie rod; MPT = mid panel tie rod; ZEE per fig. 1-11).

9) Indicates size of intermediate stiffener for pos. pressure per tables 1-15S/1-10.

10) Indicates size of intermediate stiffener for neg. pressure per tables 1-18S/1-10.

11) Indicates location of intermediate stiffener.

# PLENUMS + Sheet Metal Fabrication

<b>1” WG</b>	POS OR NEG	<b>1995 SMACNA SHOP STANDARDS FOR RECTANGULAR DUCT CONSTRUCTION</b>												
		<b>JOINTS</b>				<b>JOINT TIE RODS</b>			LONG SEAM TYPE	<b>INTERMEDIATE REINFORCEMENT</b>				<b>REMARKS</b>
		DUCT DIMENSION	PANEL GA	TYPE	SIZE	GA.	SPACE	TYPE		POS. SIZE	NEG. SIZE	TYPE	POSITIVE SIZE	
		<b>1</b>	<b>2</b>		<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	
<b>8-DOWN</b>	26	S&D	1”	24	5’-0”				L-2					
<b>9-10</b>	26	S&D	1”	24	5’-0”				L-2					
<b>11-12</b>	26	S&D	1”	24	5’-0”				L-2					
<b>13-14</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>15-16</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>17-18</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>19-20</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>21-22</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>23-24</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>25-26</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>27-28</b>	26	SS&D	1”	24	5’-0”				L-2					
<b>29-30</b>	26	TDF	1-3/8”	26	5’-0”				L-2					
<b>31-36</b>	24	TDF	1-3/8”	24	5’-0”				L-2					
<b>37-42</b>	24	TDF	1-3/8”	24	5’-0”				L-2					
<b>43-48</b>	24	TDF	1-3/8”	24	5’-0”				L-2	1-MPT	1/2” EMT	SEE TABLE	2’-6”	
<b>49-54</b>	24	TDF	1-3/8”	24	5’-0”				L-1	1-MPT	1/2” EMT	SEE TABLE	2’-6”	
<b>55-60</b>	24	TDF	1-3/8”	24	5’-0”				L-1	1-MPT	1/2” EMT	SEE TABLE	2’-6”	
<b>61-72</b>	22	TDF	1-3/8”	22	5’-0”				L-1	1-MPT	1/2” EMT	SEE TABLE	2’-6”	
<b>73-84</b>	22	TDF	1-3/8”	22	5’-0”	1 EMT	1/2”	SEE TABLE	L-1	2-MPT	1/2” EMT	SEE TABLE	2’-6”	
<b>85-96</b>	20	TDF	1-3/8”	20	5’-0”	1 EMT	1/2”	SEE TABLE	L-1	2-MPT	1/2” EMT	SEE TABLE	2’-6”	
<b>97-108</b>	18	TDF	1-3/8”	18	5’-0”	1 EMT	1/2”	SEE TABLE	L-1	A	H -2-1/2 X 1/8	N/A	2’-6”	
<b>109-120</b>	18	TDF	1-3/8”	18	5’-0”	1 EMT	1/2”	SEE TABLE	L-1	A	H -2-1/2 X 1/8	H -2-1/2 X 1/8	2’-6”	

### NEGATIVE PRESSURE EMT CONDUIT REINFORCING TABLE

EMT DIAMETER	1/2”	3/4”	1”	1-1/4”	1-1/2”	2”
EMT LENGTH	<b>UP TO 46”</b>	<b>47” TO 62”</b>	<b>63” TO 74”</b>	<b>75” TO 96”</b>	<b>97” TO 118”</b>	<b>119” TO 120”</b>

1) Indicates Joint type from fig. 1-4.

2) Indicates joint size.

3) Indicates spacing between joints.

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5) Indicates size tie rod for pos. pressure per DCS spec. S1.19.4.

6) Indicates size tie rod for neg. pressure per DCS table 1-18.

7) Indicates longitudinal seam from DCS 1-5 (L-1=Pittsburgh; L-2= snaplock).

8) Indicates intermediate reinforcement type.

(A= angle; TR= tie rod; MPT = mid panel tie rod; ZEE per fig. 1-11) .

9) Indicates size of intermediate stiffener for pos. pressure per tables 1-15S/1-10.

10) Indicates size of intermediate stiffener for neg. pressure per tables 1-18S/1-10.

11) Indicates location of intermediate stiffener.

# PLENUMS + Sheet Metal Fabrication

<b>2" WG</b>	POS OR NEG	<b>1995 SMACNA SHOP STANDARDS FOR RECTANGULAR DUCT CONSTRUCTION</b>												
		<b>JOINTS</b>				<b>JOINT TIE RODS</b>			LONG SEAM TYPE	<b>INTERMEDIATE REINFORCEMENT</b>				<b>REMARKS</b>
		DUCT DIMENSION	PANEL GA	TYPE	SIZE	GA.	SPACE	TYPE		POS. SIZE	NEG. SIZE	TYPE	POSITIVE SIZE	
		<b>1</b>	<b>2</b>		<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	
<b>8-DOWN</b>	26	S&D	1"	24	5'-0"				L-2					
<b>9-10</b>	26	S&D	1"	24	5'-0"				L-2					
<b>11-12</b>	26	SS&D	1"	24	5'-0"				L-2					
<b>13-14</b>	26	SS&D	1"	24	5'-0"				L-2					
<b>15-16</b>	26	SS&D	1"	24	5'-0"				L-2					
<b>17-18</b>	26	SS&D	1"	24	5'-0"				L-2					
<b>19-20</b>	26	SS&D	1"	24	5'-0"				L-2					
<b>21-22</b>	26	TDF	1-3/8"	26	5'-0"				L-2					
<b>23-24</b>	26	TDF	1-3/8"	26	5'-0"				L-2					
<b>25-26</b>	26	TDF	1-3/8"	26	5'-0"				L-2					
<b>27-28</b>	24	TDF	1-3/8"	24	5'-0"				L-2					
<b>29-30</b>	24	TDF	1-3/8"	24	5'-0"				L-2					
<b>31-36</b>	22	TDF	1-3/8"	22	5'-0"				L-2					
<b>37-42</b>	24	TDF	1-3/8"	24	5'-0"				L-2	1-MPT	½" EMT	SEE TABLE	2'-6"	
<b>43-48</b>	22	TDF	1-3/8"	22	5'-0"				L-2	1-MPT	½" EMT	SEE TABLE	2'-6"	
<b>49-54</b>	22	TDF	1-3/8"	22	5'-0"				L-1	1-MPT	½" EMT	SEE TABLE	2'-6"	
<b>55-60</b>	22	TDF	1-3/8"	22	5'-0"	1-EMT	½"	SEE TABLE	L-1	1-MPT	½" EMT	SEE TABLE	2'-6"	
<b>61-72</b>	22	TDF	1-3/8"	22	5'-0"	1-EMT	½"	SEE TABLE	L-1	2-MPT	½" EMT	SEE TABLE	2'-6"	
<b>73-84</b>	22	TDF	1-3/8"	22	5'-0"	1-EMT	½"	SEE TABLE	L-1	2-MPT	½" EMT	SEE TABLE	2'-6"	
<b>85-96</b>	20	TDF	1-3/8"	20	5'-0"	1-EMT	½"	SEE TABLE	L-1	2-MPT	½" EMT	SEE TABLE	2'-6"	
<b>97-108</b>	18	TDF	1-3/8"	18	5'-0"	1-EMT	½"	SEE TABLE	L-1	A	H-2 x 3/16	H-2 x 3/16	2'-6"	
<b>109-120</b>	18	TDF	1-3/8"	18	5'-0"	1-EMT	½"	SEE TABLE	L-1	A	H-2-1/2 x 3/16	H-2-1/2 x 3/16	2'-6"	

### NEGATIVE PRESSURE EMT CONDUIT REINFORCING TABLE

EMT DIAMETER	½"	¾"	1"	1-1/4"	1-1/2"	2"
EMT LENGTH	<b>UP TO 46"</b>	<b>47" TO 62"</b>	<b>63" TO 74"</b>	<b>75" TO 96"</b>	<b>97" TO 118"</b>	<b>119" TO 120"</b>

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2) Indicates joint size.

3) Indicates spacing between joints.

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5) Indicates size tie rod for pos. pressure per DCS spec. S1.19.4.

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7) Indicates longitudinal seam from DCS 1-5 (L-1=Pittsburgh; L-2= snaplock).

8) Indicates intermediate reinforcement type.

(A= angle; TR= tie rod; MPT = mid panel tie rod; ZEE per fig. 1-11) .

9) Indicates size of intermediate stiffener for pos. pressure per tables 1-15S/1-10.

10) Indicates size of intermediate stiffener for neg. pressure per tables 1-18S/1-10.

11) Indicates location of intermediate stiffener.

# PLENUMS + Sheet Metal Fabrication

<b>3" WG</b>	POS OR NEG	<b>1995 SMACNA SHOP STANDARDS FOR RECTANGULAR DUCT CONSTRUCTION</b>												
		<b>JOINTS</b>				<b>JOINT TIE RODS</b>			LONG SEAM TYPE	<b>INTERMEDIATE REINFORCEMENT</b>				<b>REMARKS</b>
		DUCT DIMENSION	PANEL GA	TYPE	SIZE	GA.	SPACE	TYPE		POS. SIZE	NEG. SIZE	TYPE	POSITIVE SIZE	
		<b>1</b>	<b>2</b>		<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	
<b>8-DOWN</b>	26	SS&D	1"	26	5'-0"				L-2					
<b>9-10</b>	26	SS&D	1"	26	5'-0"				L-2					
<b>11-12</b>	26	SS&D	1"	26	5'-0"				L-2					
<b>13-14</b>	24	SS&D	1"	24	5'-0"				L-2					
<b>15-16</b>	24	SS&D	1"	24	5'-0"				L-2					
<b>17-18</b>	24	SS&D	1"	24	5'-0"				L-2					
<b>19-20</b>	24	TDF	1-3/8"	24	5'-0"				L-2					
<b>21-22</b>	24	TDF	1-3/8"	24	5'-0"				L-2					
<b>23-24</b>	24	TDF	1-3/8"	24	5'-0"				L-2					
<b>25-26</b>	24	TDF	1-3/8"	24	5'-0"				L-2					
<b>27-28</b>	22	TDF	1-3/8"	22	5'-0"				L-2					
<b>29-30</b>	22	TDF	1-3/8"	22	5'-0"				L-2					
<b>31-36</b>	20	TDF	1-3/8"	20	5'-0"				L-2					
<b>37-42</b>	22	TDF	1-3/8"	22	5'-0"				L-2	1-MPT	½" EMT	SEE TABLE	2'-6"	
<b>43-48</b>	22	TDF	1-3/8"	22	5'-0"	1-EMT	½"	SEE TABLE	L-2	1-MPT	½" EMT	SEE TABLE	2'-6"	
<b>49-54</b>	22	TDF	1-3/8"	22	5'-0"	1-EMT	½"	SEE TABLE	L-1	1-MPT	½" EMT	SEE TABLE	2'-6"	
<b>55-60</b>	22	TDF	1-3/8"	22	5'-0"	1-EMT	½"	SEE TABLE	L-1	2-MPT	½" EMT	SEE TABLE	2'-6"	
<b>61-72</b>	22	TDF	1-3/8"	22	5'-0"	1-EMT	½"	SEE TABLE	L-1	2-MPT	½" EMT	SEE TABLE	2'-6"	
<b>73-84</b>	20	TDF	1-3/8"	20	5'-0"	1-EMT	½"	SEE TABLE	L-1	2-MPT	½" EMT	SEE TABLE	2'-6"	
<b>85-96</b>	18	TDF	1-3/8"	18	5'-0"	1-EMT	½"	SEE TABLE	L-1	2-MPT	½" EMT	SEE TABLE	2'-6"	
<b>97-108</b>	18	TDF	1-3/8"	18	5'-0"	1-EMT	½"	SEE TABLE	L-1	A	H-2-1/2 x ¼	H-2-1/2 x ¼	2'-6"	
<b>109-120</b>	18	TDF	1-3/8"	18	5'-0"	1-EMT	½"	SEE TABLE	L-1	A	H-2-1/2 x ¼	H-2-1/2 x ¼	2'-6"	

### NEGATIVE PRESSURE EMT CONDUIT REINFORCING TABLE

EMT DIAMETER	½"	¾"	1"	1-1/4"	1-1/2"	2"
EMT LENGTH	<b>UP TO 46"</b>	<b>47" TO 62"</b>	<b>63" TO 74"</b>	<b>75" TO 96"</b>	<b>97" TO 118"</b>	<b>119" TO 120"</b>

1) Indicates Joint type from fig. 1-4.

2) Indicates joint size.

3) Indicates spacing between joints.

4) Indicates type tie rod used for fig. 1-3D.

5) Indicates size tie rod for pos. pressure per DCS spec. S1.19.4.

6) Indicates size tie rod for neg. pressure per DCS table 1-18.

7) Indicates longitudinal seam from DCS 1-5 (L-1=Pittsburgh; L-2= snaplock).

8) Indicates intermediate reinforcement type.

(A= angle; TR= tie rod; MPT = mid panel tie rod; ZEE per fig. 1-11) .

9) Indicates size of intermediate stiffener for pos. pressure per tables 1-15S/1-10.

10) Indicates size of intermediate stiffener for neg. pressure per tables 1-18S/1-10.

11) Indicates location of intermediate stiffener.

4" WG	POS OR NEG	1995 SMACNA SHOP STANDARDS FOR RECTANGULAR DUCT CONSTRUCTION												
		JOINTS				JOINT TIE RODS			LONG SEAM TYPE	INTERMEDIATE REINFORCEMENT				REMARKS
DUCT DIMENSION	PANEL GA	TYPE	SIZE	GA.	SPACE	TYPE	POS. SIZE	NEG. SIZE		TYPE	POSITIVE SIZE	NEGATIVE SIZE	SPACING	
		1	2		3	4	5	6	7	8	9	10	11	
8-DOWN	26	SS&D	1"	26	5'-0"				L-1					
9-10	26	SS&D	1"	26	5'-0"				L-1					
11-12	26	SS&D	1"	24	5'-0"				L-1					
13-14	24	SS&D	1"	24	5'-0"				L-1					
15-16	24	SS&D	1"	24	5'-0"				L-1					
17-18	24	TDF	1-3/8"	24	5'-0"				L-1					
19-20	24	TDF	1-3/8"	24	5'-0"				L-1					
21-22	24	TDF	1-3/8"	24	5'-0"				L-1					
23-24	22	TDF	1-3/8"	22	5'-0"				L-1					
25-26	22	TDF	1-3/8"	22	5'-0"				L-1					
27-28	22	TDF	1-3/8"	22	5'-0"				L-1					
29-30	22	TDF	1-3/8"	22	5'-0"	1-EMT	1/2"	SEE TABLE	L-1					
31-36	22	TDF	1-3/8"	22	5'-0"				L-1	ZEE	1-1/2 x 3/4 x 18G	1-1/2 x 3/4 x 18G	2'-6"	END TIE
37-42	22	TDF	1-3/8"	22	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	1-MPT	1/2" EMT	SEE TABLE	2'-6"	
43-48	22	TDF	1-3/8"	22	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	2-MPT	1/2" EMT	SEE TABLE	2'-6"	
49-54	22	TDF	1-3/8"	22	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	2-MPT	1/2" EMT	SEE TABLE	2'-6"	
55-60	22	TDF	1-3/8"	22	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	2-MPT	1/2" EMT	SEE TABLE	2'-6"	
61-72	20	TDF	1-3/8"	20	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	2-MPT	1/2" EMT	SEE TABLE	2'-6"	
73-84	18	TDF	1-3/8"	18	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	2-MPT	1/2" EMT	SEE TABLE	2'-6"	
85-96	18	TDF	1-3/8"	18	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	2-MPT	1/2" EMT	SEE TABLE	2'-6"	
97-108	18	TDF	1-3/8"	18	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	ZEE	3 x 1-1/8 x 1/8	3 x 1-1/8 x 1/8	2'-6"	END TIE
109-120	18	TDF	1-3/8"	18	5'-0"	1-EMT	1/2"	SEE TABLE	L-1	ZEE	3 x 1-1/8 x 1/8	3 x 1-1/8 x 1/8	2'-6"	END TIE

**NEGATIVE PRESSURE EMT CONDUIT REINFORCING TABLE**

EMT DIAMETER	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
EMT LENGTH	UP TO 46"	47" TO 62"	63" TO 74"	75" TO 96"	97" TO 118"	119" TO 120"

- 1) Indicates Joint type from fig. 1-4.
- 2) Indicates joint size.
- 3) Indicates spacing between joints.
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- 5) Indicates size tie rod for pos. pressure per DCS spec. S1.19.4.
- 6) Indicates size tie rod for neg. pressure per DCS table 1-18.

- 7) Indicates longitudinal seam from DCS 1-5 (L-1=Pittsburgh; L-2= snaplock).
- 8) Indicates intermediate reinforcement type.  
(A= angle; TR= tie rod; MPT = mid panel tie rod; ZEE per fig. 1-11) .
- 9) Indicates size of intermediate stiffener for pos. pressure per tables 1-15S/1-10.
- 10) Indicates size of intermediate stiffener for neg. pressure per tables 1-18S/1-10.
- 11) Indicates location of intermediate stiffener.