

# **THIELSCH ENGINEERING, INC.**

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June 30, 2011

Mr. Ralph Ippolito  
Project Engineer  
EMCOR Group  
80 Hawes Way  
Stoughton, MA 02072-1163

Subject: Ultrasonic Nondestructive examinations and evaluation of Cooling Piping at Tremont Street Boston MA. TEI Project Number 40-11-0130

Dear Mr. Ippolito:

Thielsch Engineering personnel performed an inspection of the building cooling piping for the glycol system at the Tremont Street located in Boston, Massachusetts in June of 2011. The majority of the piping inspected was Nominal Pipe Size (NPS) 6 glycol piping and was located on the roof. Locations of NPS 2 1/2 glycol piping were also examined. This inspection was the result of a concern for a possible corrosion condition as a result of corrosion under insulation (CUI).

The inspection included a visual examination and diametric measurements of the piping followed by an ultrasonic thickness survey at exposed locations of the NPS 6 glycol piping. The same examinations were performed at selected locations of the of the NPS 2 1/2 glycol piping.

## **Visual Examination**

The visual examination of the selected glycol piping locations were revealed to be in good overall condition other than minor rusting. The visual examination did not reveal any significant service related deterioration of the exposed locations of the supply and return pipes.

## **Diametric Measurements**

Diametric measurements were taken on the exposed locations of NPS 6 piping and at selected NPS 2 1/2 glycol piping locations using a pipe tape. The pipe diameter on the NPS 6 was measured to have an outside diameter of 6.650" and the NPS 2 1/2 piping was measured to have an outside diameter of 2.900". These measurements confirm the piping supplied was in accordance with NPS 6 and NPS 2 1/2.

### **Ultrasonic Thickness Examination**

Ultrasonic thickness examinations were performed at each exposed section of NPS 6 and at random locations of the NPS 2 1/2 piping. Measurements were recorded at four corner points around the pipe (12:00, 3:00, 6:00 and 9:00 o'clock positions) at the selected areas. The ultrasonic thickness measurements were consistent for schedule 10 piping on both the NPS 6 and NPS 2 1/2 glycol piping. It was originally believed from information obtained for the customer that the glycol piping was schedule 40, however the ultrasonic measurements were not consistent with that information. Several locations were revealed with one or more recorded value below the nominal thickness for sch. 10 piping. When compared to the nominal wall thickness for each section, none of the measurements were below the estimated nominal wall thickness by more than 6%.

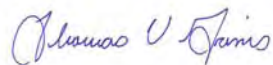
Attached to this report is a sketch showing the locations examined and the thickness data along with the diametric measurements recorded for the glycol piping. The results of the examinations are also provided is detailed in the nondestructive examination report in Appendix A.

Based upon the results of the various examinations, the glycol piping on the roof is consistent with NPS 6 sch 10 and NPS 2 1/2 sch 10. It is recommended that a similar inspection be completed after three years of continued service in order to identify an average corrosion rate of the pipes.

Thielsch Engineering appreciates your consideration of our firm and looks forward to working with you in the future. If you have any questions or I can be of further assistance, please feel free to call 401-467-6454 or you can e-mail me at [Tgrimes@thielsch.com](mailto:Tgrimes@thielsch.com).

Sincerely,

THIELSCH ENGINEERING, INC.



Thomas V. Grimes  
Field Engineering Services



Fig. 1.

Overall photographs of the glycol piping.





Fig. 2.

Overall views typical of the inspected locations of the glycol piping.



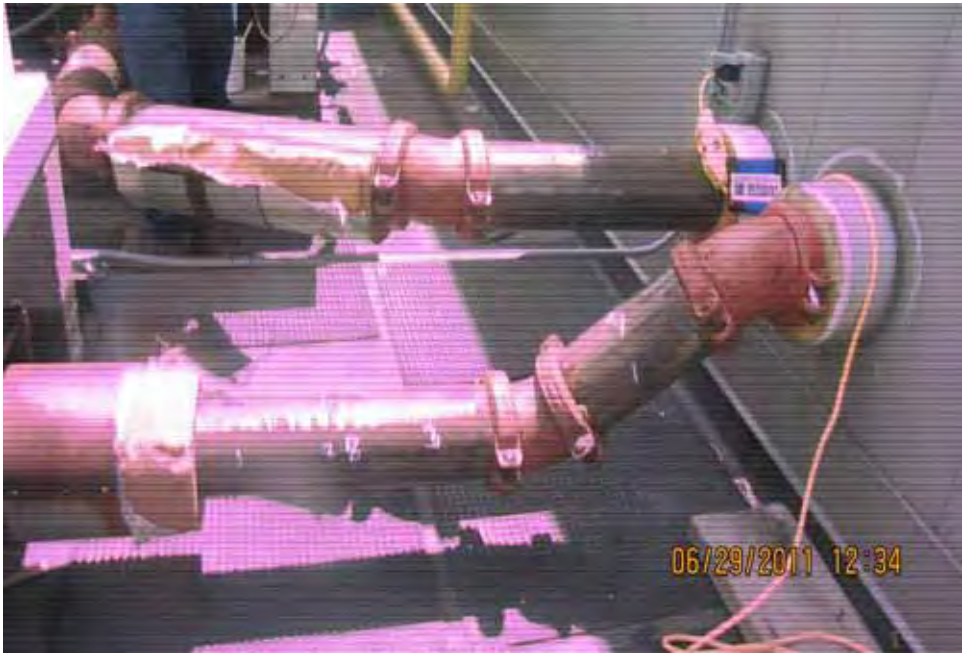


Fig. 3.

Overall views typical of the inspected locations of the glycol piping.



**NON-DESTRUCTIVE EXAMINATION REPORTS**

## COOLING PIPING



Location 1				
	A	B	C	D
1	0.132	0.137	0.139	0.136
2	0.138	0.135	0.134	0.133
3	0.136	0.131	0.132	0.134
Location 2				
	A	B	C	D
1	0.128	0.128	0.135	0.134
2	0.134	0.132	0.140	0.136
3	0.138	0.131	0.132	0.133
4	0.130	0.131	0.137	0.135
Location 3				
	A	B	C	D
1	0.132	0.134	0.132	0.134
2	0.134	0.132	0.133	0.133
3	0.135	0.133	0.136	0.134
4	0.128	0.131	0.132	0.132
Location 4				
	A	B	C	D
1	0.131	0.131	0.130	0.129
2	0.130	0.130	0.132	0.132
3	0.133	0.133	0.135	0.134
Location 5				
	A	B	C	D
5	0.139	0.128	0.131	0.131
Location 6				
	A	B	C	D
1	0.130	0.130	0.130	0.130
Location 7				
	A	B	C	D
1	0.132	0.132	0.136	0.135
2	0.132	0.134	0.133	0.134
3	0.134	0.134	0.134	0.133
Location 8				
	A	B	C	D
1	0.136	0.129	0.139	0.133
2	0.130	0.132	0.135	0.133
3	0.132	0.132	0.132	0.131

Location 9				
	A	B	C	D
1	0.132	0.133	0.133	0.134
2	0.132	0.130	0.138	0.131
3	0.132	0.136	0.136	0.135
Location 10				
	A	B	C	D
1	0.135	0.136	0.133	0.134
Location 11				
	A	B	C	D
1	0.134	0.131	0.135	0.134
2	0.134	0.130	0.134	0.134
3	0.136	0.131	0.133	0.133
Location 12				
	A	B	C	D
1	0.132	0.131	0.131	0.134
2	0.130	0.136	0.136	0.132
3	0.132	0.130	0.134	0.133
4	0.130	0.133	0.136	0.134
Location 13				
	A	B	C	D
1	0.128	0.130	0.133	0.131
2	0.130	0.134	0.132	0.132
3	0.133	0.132	0.135	0.133
4	0.130	0.132	0.132	0.133
Location 14				
	A	B	C	D
1	0.136	Obstr	Obstr	Obstr
2	0.132	Obstr	Obstr	Obstr
3	0.132	Obstr	Obstr	Obstr
Location 15				
	A	B	C	D
1	0.131	0.133	0.130	0.135
2	0.133	0.136	0.136	0.133
3	0.135	0.135	0.131	0.131

Lowest Thickness Areas.

Highest Thickness Areas.

**2 1/2"  
COOLING PIPING**



Location	NPS	Nominal Thickness	% Below Thickness	Date/Time				Location	NPS	Nominal Thickness	% Below Thickness	Date/Time					
				12:00	3:00	6:00	9:00					12:00	3:00	6:00	9:00		
Location 1								Location 9									
1								1									
2								2									
3								3									
Location 2				12:00	3:00	6:00	9:00	Location 10				12:00	3:00	6:00	9:00		
1								1	2-1/2	0.120	5.00%					0.114	
2								Location 11				12:00	3:00	6:00	9:00		
3								1									
4	2-1/2	0.120	6.67%	0.112				2	2-1/2	0.120	--	0.120					
Location 3				12:00	3:00	6:00	9:00	3									
1								Location 12				12:00	3:00	6:00	9:00		
2								1									
3								2	2-1/2	0.120	3.33%				0.116		
4	2-1/2	0.120	5.83%	0.115			0.113	3									
Location 4				12:00	3:00	6:00	9:00	4									
1								Location 13				12:00	3:00	6:00	9:00		
2								1									
3								2									
Location 5				12:00	3:00	6:00	9:00	3									
5								4									
Location 6				12:00	3:00	6:00	9:00	location 14				12:00	3:00	6:00	9:00		
1								1									
Location 7				12:00	3:00	6:00	9:00	2									
1								3									
2								Location 15				12:00	3:00	6:00	9:00		
3								1									
Location 8				12:00	3:00	6:00	9:00	2									
1								3									
2																	
3																	

Lowest Thickness Areas.  
 Highest Thickness Areas.