



# ACI Committee 376

## Concrete Structures for Refrigerated Liquefied Gas (RLG) Containment

### Agenda

Sunday, November 6, 2005

8:30 AM – 2:00 PM

Room C – 420 2B

Kansas City Marriott Downtown Hotel  
Kansas City, MO

1. **CALL TO ORDER and APPROVAL OF AGENDA** *(approx. 5 min.)*
  
2. **INTRODUCTIONS** *(approx. 10 min.)*
  
3. **APPROVAL OF MINUTES** *(approx. 15 min.)*  
Minutes of the New York meeting from April 12, 2005.
  
4. **ANNOUNCEMENTS** *(approx. 20 min.)*
  - A) **Upcoming Events:** ACI Spring - Charlotte Sessions and SP on “Concrete Containment Structures for Cryogenic Liquids: Current Needs and Recent Developments.”
  - B) **FUTURE TECHNICAL SESSIONS:** Suggestions
  - C) **Review of Committee Policies:** Requirements for voting members – 2 missed-votes limit.
  
5. **TASK GROUP STATUS AND REPORTS**
  - A) Recap of Task Group membership (please see Appendix B).
  
  - B) Report from Task Group chairs on draft sections and Letter Ballot results.

**Chapter 1 – General**Pawski (*approx. 10 min.*)

The chapter is currently being developed. The chapter outlines the scope of the document and provides definitions. The remaining work includes matching the listed definitions with what is actually used in the remaining chapters. This requires the other chapters to be essentially in their final form. These tasks will be assigned during the Kansas City meeting. The goal is that the tasks be completed in the following two weeks, followed by one week for review by other TG members.

BREAK

approx. 9:45 to 10:00 A.M.

**Chapter 2 – Materials and Tests**Berner (*approx. 120 min.*)

A draft of Chapter 2 was transmitted to all voting ACI 376 members on August 22, 2005. Twelve positive votes have been received, most with comments. A revised version of Chapter 2 is currently being prepared reflecting all comments received on this draft version of Chapter 2. Each of the suggested changes will be **reviewed and voted on** during the ACI 376 committee meeting in Kansas City.

BROWN-BAG LUNCH PRESENTATION

12:00 to 12:45 P.M.

*Saipem has kindly offered to provide a brown-bag lunch during their lunch-break presentation on its LNG containment technologies.*

**Chapter 3 – Design loads**Krstulovic (*approx. 0 min.*)

The chapter has been completed and balloted. The major part of the chapter has been approved. A total of 25 affirmative votes, of which 7 were with comments, and 1 negative vote with comments were received. 6 members did not vote. Comments are presently being addressed and corresponding paragraphs will be re-balloted in the near future.

**Chapter 4 – Minimum Performance Criteria**Krstulovic (*approx. 15 min.*)

The chapter has been completed and is currently being balloted. Paragraph R4.1.1 on requirements leading to satisfactory liquid tightness will be **reviewed and voted on** during the Kansas City meeting.

**Chapter 5 – Load factors and strength reduction factors**Krstulovic (*approx. 0 min.*)

The chapter is being developed. Voting on this chapter is pending approval of Chapter 4.

**Chapter 6 – Analysis and Design**Hoptay and Praveen (*approx. 10 min*)

Both seismic and non-seismic parts of this chapter have been completed. The non-seismic portion is currently being balloted on and the seismic portion will be balloted in the near future. The latest draft will be discussed and, if possible, voted on during the ACI 376 committee meeting in Kansas City.

**Chapter 7 – Detailing**Rushing (*approx. 15 min*)

The chapter is currently being developed. General issues will be discussed during the Kansas City meeting.

**Chapter 8 – Foundations**Allen (*approx. 20 min*)

The task group has completed approximately 50% of the chapter. Existing material will be reviewed, discussed and voted on during the Kansas City meeting. Particular emphasis will be placed.

**Chapter 9 – Construction**Mash (*approx. 5 min*)

The chapter is currently being developed. General issues will be reviewed during the Kansas City meeting.

**Chapter 10 – Commissioning**Hatfield (*approx. 30 min*)

The chapter has been completed and is currently being balloted. The latest draft will be discussed and, if possible, **voted on** during the ACI 376 committee meeting in Kansas City.

**Appendix B – Offshore GBS**Hjortset (*approx. 30 min.*)

The committee completed the first draft of Appendix B, Offshore Concrete Terminals, in March 2005. The draft was written in a report format based on input from the ACI meeting in Washington DC. The latest draft is currently being

balloted. The draft will be discussed and, if possible, voted on during the ACI 376 committee meeting in Kansas City. In particular, the following two issues will be considered:

1. For design of offshore RLG terminals, it is frequently assumed that there will be no major leakage. Minor leakage is collected using similar approach as for ships. Hence, the concrete structure will not be exposed directly to RLG as the onshore tanks are. Should the committee pose any particular requirements to the primary containment system if no major leakage is assumed?
2. NFPA 59A Edition 2001 appendix B.2 says that the facility will remain in operation during and after an OBE event. Does this mean that the OBE event shall be considered as a service limit state situation (i.e., no leakage or permanent deformation), should it be considered as an ultimate limit state situation, or should both limit states be checked?

## 6. LIAISON REPORTS

## 7. NEW BUSINESS

## 8. ADJOURNMENT

Respectfully submitted,  
*Neven Krstulovic*  
 Chairman, ACI 3764

cc: D. W. Falconer  
 M. McInerney  
 C. S. Hanskat

### Brown-Bag Lunch Presentation

## Appendix I: LNG Tank Membrane Technology by Saipem

By: Mr. Gervois Gonzague  
*Gonzague.GERVOIS@saipem-sa.com*

Saipem is an EPCI provider with a track record in LNG technologies. Its affiliates include:

- Moss Maritime, Gaz Transport and Technigaz - containment system for LNG carriers, and
- Technigaz - general contractor for turnkey project on LNG terminals. In the last 30 years, Technigaz has built 29 onshore LNG tanks in Europe and in Asia. The membrane technology was used in all these tanks.

The presentation will provide insight into Saipem's membrane technology that thus far has not been used in the States. The main principles behind Saipem's membrane technology will be reviewed during the brown-bag lunch presentation on Sunday. Information on the main construction steps will be provided to the interested parties during the Task Group session in room C-2104A on Monday (10 AM – 12 AM).

A draft version of the presentation document.

## Appendix II: Task Group Assignments

Task Gr.	CHAPTER	Allen	Arvedlund	Berner	Blackman	Carino	Douglas	Geigel	Hanskat	Harger	Hatfield	Hjorteset	BP	Hoffmann	Hoptay	Howe	Jiang	Krstulovic	Legatos	Lewis	Malhotra	Mash	Mast	Meier	Outtrim	Pawski	Rajan	Rushing	Schupack	Sullivan	Tanner	Thompson	Wu	Yao	Totals
01	1, A											X							X							X									4
02	/											X		X				X	X							X			X						6
03	2			X					X	X			X	X				X	X			X					X		X		X				11
04	3, 4, 5	X							X	X		X	X				X	X	X			X				X	X					X			12
05	6 Eq								X	X		X			X		X	X			X				X								X		10
06	7								X			X					X	X			X						X						X		7
07	8	X										X			X				X			X				X			X		X	X	X		10
08	9								X	X	X								X			X			X	X	X		X	X	X				10
09	10										X								X						X	X			X						4
10	11																	X	X																2
11	B											X					X							X									X		4
12	-											X		X				X							X								X		2
TOTAL		2							5	4	2	7	2	3	2		4	6	11			5			2	6	2	3		6		3	2	5	

**X** = Task Group Chair

**TASK GROUP LEGEND:**

- 01 = General [including Scope; Definitions; Types of tanks (Appendix A)]
- 02 = Literature search & other resources
- 03 = Materials & tests (including corrosion protection)
- 04 = Design loads; Load factors & strength reduction factors; Performance criteria
- 05 = Analysis and design
- 06 = Detailing
- 07 = Foundations
- 08 = Construction
- 09 = Commissioning
- 10 = Bibliography
- 11 = Appendix B - Offshore structures (GBS)