



## Chemically Speaking LLC

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### Taiwan BF3 ERCV Incident

I have had numerous e-mails regarding the Taiwan BF3 ERCV incident. After some investigation, I would like to set some facts straight as there are all types of rumors as to what happened. I believe we should learn from facts rather than conjecture and speculation.

This is based on informal comments from the ER Team that was preparing to transfer the cylinder, pictures of the ERCV while it was loaded and pictures after the explosion.

This cylinder was filled in the US to 500 psig, a level well below the maximum fill density for BF3 of 1800 psig. The cylinder valve started to leak when it was first opened through the diaphragm leak check hole. A decision was made at the customer site to overpack it in a ERCV which was a copycat version of the 5502 ERCV. The next morning when it was to be transported to the distributor site in Kaoshiung, they noticed the ERCV was leaking. A decision was made to push it out of the facility into the road and to call the Taiwan EPA ER team to bring a 5502 ERCV to repack the cylinder. The team started to open the ERCV containing the leaking cylinder but did not fully relieve the ERCV pressure. This may have been due to the copycat ERCV not having the ASME required flange safety nut for quick opening flanges. As the clamp relieved the compression on the flange it opened enough to allow the door to violently swing open. The internal pressure can exert a significant force against the door. The 12" dia door of a 5502 will have a force of 1113 lbs if there is 10 psig of pressure in the ERCV. At 100 psig this will be 11,130 lbs! This sudden and violent movement caused the door to be ripped off of the weld attachments when it swung open. The leaking cylinder was then ejected from the ERCV due to the pressure release. This may have further damaged the cylinder valve. The only damage to the ERCV was the missing door.

The TV videos did not show the incident in the proper historical sequence leading many to reach the wrong conclusions.

This picture was the scene after the ERCV was damaged and the cylinder flew out



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Since PRD's are now optional for BF<sub>3</sub>, the cylinder valve had no PRD. It remains a mystery as to why the valve had such a high leak rate if the valve was also closed. This would mean a double failure occurred (seat and diaphragm). Prof Chen and I are trying to get a closer look at the cylinder and valve to determine what may have happened.

Eugene Ngai