JIG Joint Inspection Group

Technical Bulletin

Bulletin No. 40

February 2011

Hydrant Pit Coupler Incidents and EI 1584 Third Edition

Background – The Auckland Airport Incident

Most of us have seen the graphic images of the Auckland incident in 1995 when a pit coupler became detached from a hydrant pit valve during fuelling, resulting in a release of fuel under full hydrant pressure. Had this spray come into contact with a source of ignition such as a hot aircraft engine or the exhaust system of a nearby vehicle, the outcome could have been an ignition of explosive force with the possibility of multiple fatalities. The event was captured on a CCTV security camera and the image below clearly shows the spray which engulfed several neighbouring aircraft.

Since this dramatic incident there have been a number of occasions at airports around the world where a hydrant pit coupler has been struck by a passing vehicle, dislodging the coupler from the pit valve. In a small number of cases this has resulted in a spray of fuel similar to the Auckland incident, when, for a variety of reasons, the pit valve has failed to close properly.

Fortunately none of these fuel releases have ignited, but the potential severity means that such an event is one of the major accident risk scenarios present at any airport with a pressurised fuel hydrant system.

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EI 1584 Third Edition - Hydrant Pit Valves and Couplers

The industry has devoted considerable time to developing an engineering barrier to the risk, and the results of these efforts are EI 1584 "Four Inch Hydrant System Components and Arrangements Third Edition". This includes a requirement for a clean break away of the pit coupler from the pit valve when subjected to a sideways impact or load, such as would result from the pit coupler being struck by a passing vehicle.

When the coupler breaks away cleanly, the pit valve poppet will close rapidly thus minimising any jet fuel release. There will still be some spillage from the hydrant dispenser hose and pipe work via the damaged coupler, but this is significantly less hazardous than a pressurised geyser of jet fuel from a damaged pit valve.

Compliance with EI 1584 Third Edition requirements for hydrant pit valves has been the subject of earlier JIG Bulletins and compliance has now been achieved at the majority of JIG airport locations. However, the major accident risk barrier which EI 1584 Third Edition provides will not be realised until the pit couplers are also compliant. Once Third Edition pit valves are installed, Third Edition pit couplers shall be procured and installed without delay, and by the end of 2011 at the latest.

Achieving Third Edition compliance at locations where the hydrant system is owned by a third party, or where the hydrant system does not operate to JIG Guidelines, is equally important for the JIG Member Companies who supply fuel to customers at these locations. At some of these airports the Hydrant Owner has not yet been convinced of the need to invest in modifications or valve replacements to meet the Third Edition requirements. The incident described below, which occurred recently at a major airport location, clearly illustrates the advantages of EI 1584 Third Edition

2010 Hydrant Coupler knock-off incident

The effectiveness of pit valve and pit coupler assemblies meeting the requirements of EI 1584 Third Edition were recently highlighted in an incident where a pit coupler was struck by a baggage trolley. The attached Incident Summary describes the incident, and of particular note is that the pit coupler broke away cleanly from the pit valve as designed, allowing the pit valve to close, resulting in a relatively minor spillage of 4 litres of fuel. This outcome is in stark contrast to that at Auckland, and clearly highlights why we going ahead with EI 1584 Third Edition compliance.

HYDRANT COUPLER KNOCK-OFF INCIDENT SUMMARY SHARING LESSONS

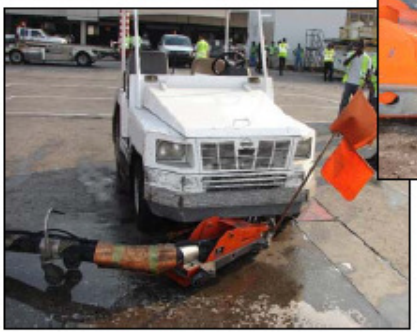
Brief Description of the Incident

On 23 August 2010, during the fuelling of an A320, using a hydrant dispenser, a baggage tug drove directly into the intake coupler which was knocked completely off of the hydrant pit valve. The hydrant pit valve closed and a quantity of fuel, estimated at 4 litres, was spilled.

The operator had checked around the hydrant pit a few seconds before and while walking back to the dispenser, he heard an impact, turned, and saw what had happened. He released the deadman then activated the Hydrant Emergency Stop Button (ESB) at the head of the stand. He also gave an order by radio to his colleague, who was on the adjacent stand, to activate that stand's ESB. He then confirmed with the depot that the hydrant had closed.

The Airport Fire Department attended, sprayed foam over the area and cleared the spill then continued to stand-by. The tug was towing one dolly loaded with baggage. The tug had stopped directly over the hydrant pit and pit valve, with the hydrant intake coupler and 4" intake hose (fitted with a "Crocodile" unit) lodged under the front of the tug.

The tug driver tried to drive the tug away, but a fuelling operator stopped him and told him not to remove anything until the Airport Authority arrived.



The intake coupler and 'Crocodile' unit were damaged. The air-line was severed and the fuel sense line had a small cut. No damage was found on the intake hose. The hydrant intake coupler poppet o-ring was found on the ground, but the pit valve showed no external signs of damage.

Refuelling of the A320 was completed using a fueller with the aid of the dispenser's platform. After the fueller was driven away, the dispenser platform was lowered and the aircraft was carefully pushed back by another tug allowing the aircraft to depart.

The tug was lifted from the hydrant pit using a forklift. The hydrant was isolated, depressurised and the hydrant pit valve removed and quarantined. The riser, base flange and pit box (an "environmental" type) were examined and no movement or damage was evident. A tested hydrant pit valve was fitted and the hydrant system slowly repressurised, vented and inspected to bring the hydrant back into full service.

Critical Factors

- *Airport CCTV revealed the tug driver was looking behind him as he drove forwards towards the hydrant pit.*
- *The tug hit the hydrant intake coupler while fuel was flowing at an estimated 760 litres per min. The hydrant intake coupler broke away from the pit valve under the force of the impact and the hydrant pit valve closed (in accordance with the "break-away" design).*
- *The tug driver, who had only 4 months experience of on-apron driving and limited training, tried to move the tug after the impact.*

Lessons Learnt

Although it was daylight with a pit flag in place reflective markings on the intake hose and the stand was not congested, the incident still happened.

The operator reacted quickly to deactivate the deadman and activate the ESB. He also requested a second ESB to be pressed and checked the hydrant had been closed.

The tug driver was stopped from moving the tug and potentially creating a spark by dragging the coupler or crocodile on the apron concrete.

All pit valves and couplers had been upgraded to API/IP 1584 Third Edition(1) in 2006. The pit valve was fitted with an air-operated pilot. The coupler performed in accordance with the designed "break-away" characteristics and allowed the pit valve to close; 13 of the 16 coupler lugs sheared as a result of the impact.

(1) From July 2010, the document reference has changed to EI 1584 Third Edition (same content, which was re-approved in Feb 2007).

Rev 1: 23rd Nov 2010