PPR FAILURES
STRESS FATIGUE
ENTRAINED AIR
INCREASE IN MATERIAL FAILURE
FACTORS

- Pressure Stability
- Water Hammer
- Entrained Air
- Temperature
- System Failure
- Velocity
- Chlorine
- Copper
- Oxygen
- Cavitation
Investigation of Root Cause of Polyethylene Pipe Leaks & Bursts

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Abstract

Polyethylene (PE) pipes have been reportedly failing through leaks and bursts at a higher rate in the North West Region (NWR) compared to other regions. These high failure rates mean frequent expeditions are required to fix the pipes, which raises issues in cost and resource allocation, as well as the safety of the personnel involved. This issue is of increasing concern as the usage of PE pipes is increasing. This project is investigating the root cause of the higher rate of burst or leaks of polyethylene pipe in the NWR, to recommend solutions that will mitigate the high rate of failures of the pipes.
Perth Children’s Hospital will not open this year, WA Government concedes

The Perth Children’s Hospital will not open this year after an independent report revealed brass fittings were the ‘culprit’ behind ongoing problems with lead contamination issues on Friday afternoon.

Health Minister Roger Cook said a month-long review by Western Australia’s Chief Health Officer revealed the cause of the contamination, and found the source of the lead was due to the ‘desiccification of brass fittings’.

The Perth Children’s Hospital has been plagued with issues since its construction began.

As a result, Mr Cook confirmed the Perth Children’s Hospital would not open ‘on time’.
WA Health Department brushes off latest construction woe at $1.2b Perth Children's Hospital

By Jacob Kagi
Posted 16 Jun 2016, 12:25pm

West Australian Health Department officials have brushed off the latest construction problem at the Perth Children's Hospital, saying a burst water pipe has caused only minor damage.

Health Department officials told a parliamentary hearing the flooding in the basement of the $1.2 billion hospital would not delay its opening, or come at any cost to the state.

Yesterday's flooding was the latest in a string of construction issues to plague the hospital, which had been due to open late last year but has been significantly delayed.

The 298 bed facility is now due to be handed over to the Health Department in August and be fully operational by November.

"From experience of all these large commissioning projects there are going to be these occurrences during the building of such a complex facility," Health Department Director-General David Russell-Weisz told Parliament.
Tests confirm lead in fountains outside Optus Stadium

John Flint | PerthNow
April 29, 2018 12:00AM
Leaky pipes threaten Wellington hospital operating theatres

Tom Hunt • 17:38, Oct 28 2018

Leaky pipes were discovered in Wellington Hospital eight years after it was opened.

Leaky pipes at Wellington Hospital could take out a theatre or other crucial area as the "extreme risk" issue rolls towards its fourth year.

Capital & Coast district Health Board has been struggling with leaking copper pipes for years but a just-released risk assessment shows that a long term solution appears to be a pipedream — even as it pursues legal
Burst water pipe floods Perth's Fiona Stanley Hospital

Updated 9 July 2015 — 6:02pm, first published at 3:00pm

Flooding at Perth's new Fiona Stanley Hospital for the second time in less than three months prompted ambulances to be diverted and operating theatres closed on Thursday.

By 4.30pm, repairs had been effected and most services resumed.

A spokesman said that Friday's elective surgery would proceed as scheduled.

A main pipe that supplied ward towers burst in April, affecting access to hot water and the air conditioning system.
Burst water pipe causes damage to nine floors of Verve Residences building in Newcastle West

Max McKinney

DAMAGE from a water leak on the ninth floor of a new Newcastle West apartment building will prevent people from moving in to the lower floors next week as planned.
Residents evacuated after burst water system floods CBD high-rise

Ben Cardwell | Herald Sun
August 17, 2019 7:08PM

Residents of a 48-storey high-rise in Melbourne’s CBD have been forced to evacuate after a hot water system burst, spilling water on to the floors below.
Flexible braided pipes responsible for more than 20 per cent of water damage claims

It costs as little as $10, lurks beneath hundreds of household kitchen and bathroom sinks across Australia, and could cause thousands of dollars' damage if it is not checked regularly.

Flexible braided hoses accounted for more than one in five water damage claims lodged by Australian households in 2016, according to new research released by general insurer IAG.
WHY NOW?

WHAT HAS CHANGED?
EXPANSION CONTROL VALVE

1200 kPa
ECV

1200 kPa
TEMPERATURE MIXING VALVE
MIXING VALVE
AIR RELIEF VALVE
AIR RELIEF VALVE

INCREASED PRESSURE
AIR RELIEF VALVE

EXPANSION TANK
BACKFLOW
VSD PUMPS
VSD PUMPS

CYCLIC PRESSURES
VSD PUMPS

CYCLIC PRESSURES
PRV

CYCLIC PRESSURES
COMBINE ALL DEVICES TOGETHER

WHAT HAPPENS?
DAMAGING SYSTEM DYNAMICS
FIXED ONE PROBLEM

ONLY TO CREATE ANOTHER
AIR

PRESSURE
AIR

TEMPERATURE
AIR EXPANSION AT PRESSURE

Air volume under pressure

- 1 Atm: 1/2
- 2 Atm: 1/3
- 3 Atm: 1/4
- 4 Atm: 1/4
- 5 Atm: 1/5
- 6 Atm: 1/6
- 7 Atm: 1/7
- 8 Atm: 1/8
PRESSURE DROP

400kpa
AIR IN PIPES + RAPID PRESSURE DROP
EQUALS CAVITATION
SUMMARY

PIPING FAILURES ARE A COMBINATION

• COMPLEX FLUID DYNAMICS
• RANGE OF MODERN EQUIPMENT
• CHANGES IN SYSTEM DESIGN
• INCREASED INSTALLER ERROR
WE CAN’T SOLVE PROBLEMS BY USING THE SAME KIND OF THINKING WE USED WHEN WE CREATED THEM
Thanks for listening