

Committee(s):	Date:
Markets	29 November 2017
Subject: Smithfield Market – Condenser Water Cooling System - Update	Public
Report of: The City Surveyor (Report no. CS561/17)	For Information
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Summary

This update report informs Members about recent developments on Smithfield Market's refrigeration condenser water cooling system.

The system was set to provide water at 24°C since 27 September and the temperature was further increased to 25°C on 14 November 2017. Although there were early reports of some fridges struggling, following the replacement of three fridge condensers with higher capacity units, reports of problems then ceased.

The reports of dirt contamination in condensers in August were traced to malfunction of the City's water softeners which supply make-up water to the system. These problems were resolved in early September.

Interviews with the Tenants' maintenance contractors about the use of and release to atmosphere of refrigerant gases from fridges are continuing and once complete the City will decide what line it wishes to take and policy for the future.

Recommendation(s)

Members are invited to note the contents of this report.

Main Report

Background

1. The Market's condenser water cooling system removes waste heat from 120 tenants' refrigeration units in East, West and Poultry Markets and dissipates it to the atmosphere via five cooling towers located in the Poultry Market. The system is operated and maintained by the City Corporation as Landlord.

2. In 2014 the City Corporation completed a programme of works to improve the water circulation in the three Market buildings served and remove dirt contamination in the system. As a result performance greatly improved.
3. The cooling system was originally specified to provide water to Tenants' fridges at 30°C. Over the years this was gradually reduced and for approximately five years was set at 20°C. This was done to assist fridges at a time when there were issues with water flow, dirt contamination, system balancing, and Tenants' condenser under-sizing.
4. Over the last 18 months the City has gradually raised the system operating temperature a degree at a time to alleviate airborne dirt ingestion at cooling towers, allow more economical operation in the future, and reduce risk of breakdown. The eventual aim is to operate the system at 25°C year round. However, a higher temperature results in fridges working harder and in some cases experiencing problems.

Current Position

5. In line with the City's plan, the system operating temperature was raised from 23°C to 24°C on 27 September 2017. Following this reports were received from one of the maintenance contractors of fridge problems. With the agreement of the respective Tenants he replaced three fridge condensers with higher capacity units which resolved the issues with those fridges. More recently a fourth condenser has been replaced. Since then no further issues have been reported.
6. On 14 November the system operating temperature was raised a further degree to 25°C.

Incidents since last report

7. Since the September 2017 report there have been no further operating incidents reported on the cooling system.

Investigation into refrigerant gas releases from Tenant's equipment last year

8. The City's investigations into the use and unintended release of refrigerant gases from Tenants' fridges have continued. The first of the three refrigeration contractors, Bourne Refrigeration, was interviewed on 26 September 2017. This contractor maintains only five fridges in the Meat Market. He advised some of those operated at high refrigerant gas pressure and the high pressure cut-out switches were set very high. Trips had occurred when the water had been interrupted, but without gas discharge. The tenants do not have a planned maintenance programme for these fridges and maintenance tends only to be reactive. Details of work done are recorded on invoices; ideally there would be a maintenance log book, but this is not the case.
9. The second refrigeration contractor, R Perkins & Sons, was interviewed on 16 November 2017. They maintain 59 fridges in the Meat Market, including the

three which released gas in November 2016 when the City's pumps stopped. They advised that there are maintenance contracts in place for all fridges managed, which includes preventative maintenance and leak checks up to four times a year, and they claim to keep formal records of refrigerant use and any discharges. The release of gas is the result of the high pressure cut-out switch being set at a level too close to the rating of the pressure relief valve.

10. Due to availability of key personnel it has proved difficult to find suitable dates to meet the third refrigeration contractor. Once all three have been seen the City will decide what line it wishes to take and policy for the future.

Follow-up to previous incidents

11. As covered in the last report, excessive amounts of dirt contamination had been detected in the cooling system in August-September 2017. The water treatment sub-contractor confirmed that both water softeners had been passing hard (un-softened) water into the system for two separate periods of several days in August. On one service visit the salt supply had been found to have run out. This would have accounted for the calcium scale contamination found to have accumulated in strainers and condensers. The time taken to respond was at least partly due to a new member of their staff taking over the duties at this time who was not adequately briefed on the critical need to rectify any faults found as a matter of priority. The faults were cleared by early September.
12. The problems occurring resulted in a claim from one of the maintenance contractors for cleaning condensers totalling £2,120. This charge has been met by the City.
13. The Superintendent, Facilities Manager, Principal Engineer and Head of Maintenance have discussed this and agreed a number of measures to prevent a recurrence:
 - Set up automated email warning messages when system goes into alarm;
 - Review call-out procedures with water treatment sub-contractor;
 - Set up service level agreement with Skanska to respond to alarms within agreed timescales if possible;
 - Arrange annual test of all system alarms;
 - Increase reserves of salt held on site local to softeners.

Proposals

14. Performance of fridges will continue to be monitored and any reports of fridges experiencing problems investigated following the increase in temperature to 25°C.
15. The City will complete the investigations with maintenance contractors into the use and unintended release of refrigerant gases from Tenants' fridges.

Corporate & Strategic Implications

16. The system supports the meat trade at Smithfield Market and the following Strategic Aims:
- To provide modern, efficient and high quality local services and policing within the Square Mile for workers, residents and visitors with a view to delivering sustainable outcomes.
 - To provide valued services to London and the nation.

Implications

17. The cooling system operated by the City provides a critical service for Tenants' refrigeration equipment. A failure of the system could potentially expose the City to claims from Tenants for loss of product. The City therefore needs to ensure it provides a reliable service that meets the needs of the Tenants, whilst at the same time keeping its operating and maintenance costs and risk of breakdown to the minimum.

Conclusion

18. Following the increase in system temperature to 24°C on 27 September 2017, there were reports of some fridges struggling at this higher temperature. After three fridge condensers had been replaced with higher capacity units, reports of problems then ceased. As all fridges appeared to be running satisfactorily, the temperature was further increased a final step to 25°C on 14 November 2017.
19. The reports of dirt contamination in condensers in August were traced to malfunction of the City's water softeners which supply make-up water to the system. The problems were resolved in September.
20. Recognition by Tenants of the need to replace further condensers with higher-capacity units is welcome. There are probably a further dozen fridges on the system which would benefit.
21. Interviews with the Tenants' maintenance contractors about the use of and release to atmosphere of refrigerant gases are continuing and once complete the City will decide what line it wishes to take and policy for the future.

Background Papers

Report of the City Surveyor 'Smithfield Market – Condenser Water Cooling System – update' to Markets Committee, September 2017 (Report ref. CS413/17).

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