

Committee(s):	Date:
Markets	23 January 2017
Subject: Smithfield Market – Condenser Water Cooling System - Update	Public
Report of: The City Surveyor (Report no. CS015/17)	For Information
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Summary

This report details the latest position on the City's trial to increase the operating temperature of Smithfield Market's Condenser Water Cooling System, which provides cooling to the Market Tenants' refrigeration equipment.

The trial to increase the temperature of the system resumed after a break for Christmas and the new year. As at 4 January, the temperature setting is 23°C. During the course of the trial at the end of last year, fridge problems occurred after 23 November following a failure of the City's West Market pump on that date, which is believed to have been the main cause.

Further increases to 24° then 25°C will be made over the next two weeks if no material problems emerge. If the fridges operate successfully at 25°C, this temperature will remain the permanent setting.

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 Markets and remove dirt contamination in the system. As a result performance has significantly 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 has been 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. Following completion of its remedial works, the City wishes to increase the temperature to reduce its operating costs and the risk of cooling tower breakdown and is currently undertaking a trial to evaluate the impact of increasing it, if any, on Tenants' fridges.

Current Position

4. With the agreement of the Smithfield Market Tenants Association (SMTA), the full trial commenced on 18 October 2015 when the cooling system operating temperature was increased from 20° to 22°C. With no reported fridge problems at this time, further increases were made to 23°C on 31 October and 24°C on 22 November.
5. On the evening of 23 November there was a failure of the West Market condenser water duty pump. No damage was found and it is suspected the cause was a spurious mains power surge; further tests did not detect any problem. Market maintenance engineers and fridge engineers were called out and the system was restored by 11.00pm, with West Market standby pump brought into service.
6. It appears this incident gave rise to a number of fridge problems in West Market with three fridges discharging refrigerant gas to atmosphere and several other fridges on North West deck tripping as a result of air within the cooling system accumulating in condensers, preventing normal operation. Where the air came from has not been established, but one possibility is via the shaft seal on the standby pump, as this had not run for a long time, and may have dried out, allowing air to be sucked into the system when this pump was run. As these events were triggered by a pump failure, the City has agreed to meet the call-out costs.
7. The discharge of refrigerant gas is not an acceptable practice and the fridge high pressure cut-out switch should operate, turning off the fridge, before the relief valve discharges gas. Here it seems the adjustable setting of the cut-out

switch may have been too close to the pressure at which the relief valve operates. The SMTA have therefore been asked to remind Tenants that safety switches should be set at the correct pressure to operate before the relief valve and the valves themselves are checked to ensure they discharge at the correct pressure and comply with current standards, particularly if they are original fittings dating from the 1990s fit-out.

8. The final increase in temperature to 25°C was made on 6 December as planned.
9. Representations were then received from the SMTA on behalf of Tenants about the system temperature over the period prior to Christmas when stocks would be high, with a request that it be reduced for this period. The SMTA expressed their view that problems were occurring with water above 24°C. This was discussed with the Superintendent and in view of the recent issues it was agreed to reduce the temperature setting to 22°C from 15 December over the Christmas/new year period.
10. The SMTA has since agreed the temperature can be increased again, a degree a week, and on 4 January it was reset to 23°C.

Proposals

11. The temperature trial has been resumed and should reach 25°C by 18 January. Officers will continue to monitor the system closely and investigate any problems reported.
12. Whilst temperature of the water supply affects the amount of heat that can be removed from a condenser, the correct water flow rate is also essential for full heat removal. From the flow rates observed, it appears there is a slight difference in performance of the two West Market pumps, with one generating marginally more flow. Experiments are planned in early January to re-check which gives the best flow rate. As mentioned in the last report, East and West pumps are due to be replaced with higher capacity pumps by spring, and the original pumps which are life-expired will be scrapped.

Other work concerning the cooling system

15. The 10-page Operating Specification for the cooling system drafted in early 2016 has been revised to take account of the SMTA's comments and re-issued.

Corporate & Strategic Implications

17. 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

18. 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.
19. Operating the system at a higher temperature will reduce strain on the City's cooling towers and the risk of breakdown, as well as reducing operating costs. Whilst Tenants' fridges will have to run slightly longer, consuming more power, 25°C is felt to be a reasonable compromise, and still within their technical specification.

Conclusion

20. The trial to increase the water operating temperature of the cooling system has resumed after a break for Christmas and the new year. As from 4 January the temperature setting is 23°C. During the course of the trial at the end of last year, fridge problems occurred after 23 November following a failure of the City's West Market pump on that date, which is believed to have been the main cause.
21. Further increases to 24° then 25°C will be made over the next two weeks if no material fridge problems emerge. If the fridges operate successfully at 25°C, this temperature will remain the permanent setting.
22. Officers will continue to monitor the system closely, investigate any problems reported, and take further action as appropriate.

Background Papers

Report of the City Surveyor 'Smithfield Market – Condenser Water Cooling System – update' to Markets Committee, November 2016 (Report ref. CS396/16).

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