

Committee(s):	Date:
Markets	10 May 2017
Subject: Smithfield Market – Condenser Water Cooling System - Update	Public
Report of: The City Surveyor (Report no. CS193/17)	For Information
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Summary

Since the last report the cooling system temperature trial has continued and shown that most fridges can operate with condenser cooling water at 25°C at this time of year. However, there are signs of some fridges suffering stress at this temperature, exhibiting high refrigerant pressure. Since 4 April the temperature has been set at 23°C.

The City's condenser water pumps are due to be replaced within the next two months. Once in use, water flows in the system will be higher, and flow rates to fridges with continuing issues will be re-checked. The operating temperature will also be reset to 25°C. The City will continue to monitor the system closely and discuss any on-going issues with the respective fridge maintenance contractors.

Regulations relating to the unintentional release of refrigerant gases from fridges under fault conditions have been investigated by Officers and appear to be a breach of the 2015 Fluorinated Gas Regulations. Further advice is being sought from the Environment Agency and Tenants are being reminded they have a duty to comply in full with the regulations. Subject to agreement with the Environment Agency, the City also proposes to check Tenants' fridge maintenance records.

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 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 has increased 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 the higher operating temperature, if any, on Tenants' fridges.

Current Position

4. The final increase in the temperature of the cooling system to 25°C was applied on 31 January 2017. The system was maintained at this temperature until 4 April 2017. Following comments from one of the Tenants' refrigeration maintenance contractors, it was reduced on this date to 23°C in order for the effect on two fridges to be assessed (see paras 7-10). It remains at this temperature pending replacement of the City's pumps.

Incidents since last report

5. Following the failure of the West Market condenser water duty pump on 23 November 2016, covered in the last report, the pump and controls were tested on 12 January by the City's controls specialist, and appeared to be satisfactory. However the same pump tripped again on 15 March, with the standby pump brought into service to maintain the flow. As the standby pump produces a lower flow, the original pump was restarted the following day, and has run satisfactorily since then.
6. On 1 March a leak in condenser water pipework at the end of south-west 1st floor fridge deck occurred. This was found to be due to corrosion. The Market maintenance team isolated the pipework concerned and were able to complete a repair within four hours. Fridges in that quadrant had to be shut down but as it was outside market trading hours, there was negligible impact of fridge temperatures.

System temperature issues

7. The SMTA gave their view in January that fridge problems start to occur with water at 24-25°C. Comments were also received from two of the Tenants' fridge maintenance contractors. One made general observations that the higher operating temperature was forcing fridges to work harder. This would not be unexpected.
8. The other advised that two of their fridges were experiencing high refrigerant pressure and consequently it had been necessary to remove refrigerant from the systems. The City checked the water flowrates to both fridges which were found to be low in one case (an Absalom & Tribe chiller) and normal in the other (a P J Kilby chiller). The former has always had a low flow and is assumed to have a high hydraulic resistance.
9. In order to check the effect of water temperature on refrigerant pressure, the City agreed to a request to reduce the temperature to 23°C. The maintenance contractor advised that this had a beneficial effect (reducing refrigerant pressure from 280 to 250 pounds/inch²) on both units.
10. As the City's pumps are being replaced within the next two months with higher capacity pumps, it was decided to leave the temperature at 23° and re-check flow rates once the change has been completed.

Investigation into refrigerant gas releases

11. As explained in the last committee report, in November 2016 three fridges in West Market discharged refrigerant gas to atmosphere when the City's pumps failed. The type of gas is from the hydrofluorocarbon (HFC) family which have a high Global Warming Capacity and are subject to increasingly stringent controls. The Fluorinated Gas Regulations 2015 (superseding a 2006 version) are aimed at reducing the release of such gases, and impose a duty on all owners and operators of refrigeration equipment to minimise the release of gases to atmosphere; use only trained technicians for any work carried out; check for leaks at specified intervals, keep full records of any refrigerant added and undertake mandatory checks, making records available for inspection by authorities, and recover any gas when disposing of equipment.
12. The incidents which occurred at the Market have been discussed with the Superintendent and Environmental Health Assistant Director. The City has also established contact with the Environment Agency to obtain further advice. The Environment Agency is the regulatory body for the Fluorinated Greenhouse Gases (F-gas) and the Ozone Depleting Substances (ODS) Regulations in England.
13. The Agency has confirmed the regulations include an obligation for operators of equipment to take precautions to prevent the unintentional release of those gases, and to take all measures which are technically and economically feasible to minimise leakage. The City has requested further details of the penalties that would be applicable in the event of breaches of these requirements, and clarification of which party is responsible for enforcement.

14. The City has drafted a letter to be sent by the Superintendent to all Tenants drawing attention to the regulations, reminding them of their responsibilities in this area and informing them it intends to carry out an inspection of their records.

Further work planned

15. West and East condenser water pumps (also East heating and chilled water pumps) and their associated control panels are being replaced as a project within the Additional Works Programme. The condenser water pumps will be updated to provide greater flow. A contract for the work has been let to W G Wigginton Ltd, one of the City's framework contractors, and the new condenser water pumps should be in operation by June.

Proposals

16. The temperature trial has shown that most fridges can operate with condenser cooling water at 25°C at this time of year. However, some fridges show signs of stress at this temperature, exhibiting high refrigerant pressure.
17. Once the pumps have been replaced, it is intended to reset the temperature back to this figure, re-measure flow rates, and review any on-going fridge issues. The City will again encourage Tenants to replace any fridge condensers considered undersized.
18. The City will write to Tenants about the refrigerant regulations and contact their maintenance contractors to review their records.

Corporate & Strategic Implications

19. 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

20. 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.

21. 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 should be within their technical specification. It appears that two fridges operate under stress at this temperature, and possibly more.
22. The unintentional release of refrigerant gas from fridges to atmosphere would appear to be a breach of the 2015 Fluorinated Gas Regulations, and Tenants responsible for incidents where this occurs may be liable to penalties. Further advice is being sought from the Environment Agency on the penalty regime.

Conclusion

23. The temperature trial has shown that most fridges can operate with condenser cooling water at 25°C at this time of year. Some fridges are showing signs of stress at this temperature. In at least one case there is a low water flow.
24. The City's condenser water pumps are due to be replaced within the next two months. Once in use, water flows in the system will be higher, and flow rates to fridges with continuing issues will be re-checked. The higher flows may alleviate previous fridge problems. The City will continue to monitor the system closely and discuss any on-going fridge issues with the respective fridge maintenance contractors.
25. Regulations relating to the unintentional release of refrigerant gases from fridges under fault conditions have been investigated by Officers and are considered a breach of the 2015 Fluorinated Gas Regulations. Further advice is being sought from the Environment Agency on the penalty regime.

Background Papers

Report of the City Surveyor 'Smithfield Market – Condenser Water Cooling System – update' to Markets Committee, January 2017 (Report ref. CS015/17).

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