85℃热水余热利用情况



图1.余热利用设计图

热源参数：进口温度85℃，流量130t/h

1. 参数设定1

有机朗肯循环部分

|  |  |
| --- | --- |
| 工质 | R245fa |
| 节点温差/℃ | 10 |
| 过热度/℃ | 3 |
| 换热器最小温差/℃ | 10 |
| 热损失/% | 3 |
| 换热器压损/% | 5 |
| 主蒸汽压损/% | 10 |
| 冷凝器压损/% | 5 |
| 机械效率/% | 96 |
| 发电效率/% | 93 |
| 汽轮机效率/% | 75 |
| 泵效率/% | 70 |
| 环境温度/℃ | 20 |

热泵部分

|  |  |
| --- | --- |
| 工质 | water |
| 压损机效率/% | 80 |
| 热损失/% | 3 |
| 节流阀效率/% | 95 |
| 换热器压损/% | 5 |

供热部分

|  |  |
| --- | --- |
| 换热器热损/% | 3 |
| 供热管道热损/% | 10 |
| 供热外界环境温度/℃ | -5 |
| 维持室内温度/℃ | 18 |
| 热量需求/W/m² | 70 |

2）各节点参数

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 节点 | 温度/℃ | 压力/kPa | 焓/kJ▪kg-1 | 熵/ kJ▪K-1 | 干度 | 质量流量/kg▪s-1 |
| 1 | 25.00 | 148.25 | 232.46 | 1.1134 | 0 | 18.17 |
| 2 | 25.15 | 400.00 | 232.72 | 1.1137 | 0 | 18.17 |
| 3 | 56.14 | 380.00 | 446.46 | 1.7738 | 1 | 18.17 |
| 3’ | 55.22 | 342.00 | 446.46 | 1.7796 | 1 | 18.17 |
| 4 | 38.12 | 156.05 | 435.02 | 1.7889 | 1 | 18.17 |
| 5 | 45.00 | 200 | 188.60 | 6.3853 | 0 | 85.30 |
| 6 | 35.00 | 200 | 146.81 | 5.0506 | 0 | 85.30 |
| 9 | 18.31 | 2.11 | 199.31 | 0.694 | 0.0512 | 0.94 |
| 10 | 17.49 | 2.00 | 2532.90 | 8.722 | 1 | 0.94 |
| 11 | 215.47 | 12.00 | 2909.70 | 8.883 | 1 | 0.94 |
| 12 | 49.39 | 11.40 | 202.62 | 8.103 | 0 | 0.94 |
| 13 | 35.00 | 200 | 146.81 | 5.0506 | 0 | 59.22 |
| 14 | 45.00 | 200 | 188.60 | 6.3853 | 0 | 59.22 |
| g1 | 85.00 | 100.00 | 356.05 | \ | \ | 36.11 |
| g2 | 59.34 | 100.00 | 248.49 | \ | \ | 36.11 |
| g3 | 35.00 | 100 | 146.01 | \ | \ | 36.11 |
| g4 | 20.00 | 100 | 84.01 | \ | \ | 36.11 |
| c1 | 20.00 | 101.00 | 84.01 | \ | \ | 220.00 |
| c2 | 25.00 | 101.00 | 100.74 | \ | \ | 220.00 |

（3）系统性能

|  |  |
| --- | --- |
| 透平做功/kW | 207.82 |
| 发电功率/kW | 185.54 |
| 泵耗功/kW | 4.88 |
| 压损机耗功/kW | 355.17 |
| 净功率/kW | -174.51 |
| 吸热量/kW | 9823.36 |
| 供热量/KW | 6552.56 |
| 供热面积/万m² | 9.36 |
| 供热效率/% | 66.7 |