DIN EN 327:2014-11 (E)

Heat exchangers - Forced convection air cooled refrigerant condensers - Test procedures for establishing performance

Contents

Page

Foreword 4

1 Scope 6

2 Normative references 6

3 Terms and definitions 6

4 Symbols 9

5 Standard capacity 11
5.1 Basis for standard capacity data 11
5.2 Standard capacity conditions 11
5.3 Conditions for the nominal air flow rate 12
5.4 Conditions for nominal fan power 12

6 Manufacturer's data 12

7 Measurements 13
7.1 Uncertainty of measurements 13
7.2 Measurement criteria 14
7.2.1 Pipe side temperature measurement 14
7.2.2 Condenser and gas cooler inlet temperature 15
7.2.3 Subcooled refrigerant temperature 15
7.2.4 Water temperatures (Balancing air cooler - Air side calorimeter) 15
7.2.5 Gas cooler outlet temperature 15
7.2.6 Air temperatures 15
7.2.7 Pressure measuring points 16
7.2.8 Refrigerant flow rate 16
7.2.9 Water flow rate 16
7.2.10 Oil content 16
7.2.11 Non-azeotropic refrigerant 16

8 Testing methods and equipment 16
8.1 Testing methods for capacity 16
8.1.1 General 16
8.1.2 High pressure calorimeter (primary method) 17
8.1.3 Low pressure calorimeter (primary method) 17
8.1.4 Air side calorimeter (primary method) 17
8.1.5 Refrigerant flow method (confirming method) 18
8.1.6 Air flow method 18
8.2 Air flow measurement 18
8.3 Equipment for capacity measurement 18
8.3.1 General 18
8.3.2 High pressure calorimeter 19
8.3.3 Low pressure calorimeter 20
8.3.4 Air side calorimeter 20
8.3.5 Refrigerant flow method 21
8.3.6 Liquid receiver 21

9 Test procedures 21

9.1 General 21
9.2 Heat loss measurement - calibration 22
9.2.1 General 22
9.2.2 High pressure calorimeter - direct heat inducement into refrigerant 22
9.2.3 Low and high pressure calorimeters - heat inducement into secondary fluid 23
9.2.4 Air calorimeter room 23
9.3 Capacity measurement 23
9.3.1 Steady-state 23
9.3.2 Test duration 24
9.3.3 Conducting the test 25
9.3.4 Data to be recorded 25
9.4 Measuring the fan performance 26

10 Capacity calculation 26
10.1 General 26
10.2 Heat loss factor: calibration test 26
10.2.1 High pressure calorimeter - direct heat inducement into the refrigerant 26
10.2.2 High and low pressure calorimeter - indirect heat inducement into the refrigerant 26
10.2.3 Air side calorimeter 27
10.3 Capacity measurement test 27
10.3.1 High and low pressure calorimeter - flow rate measurement methods 27
10.3.2 High pressure calorimeter method - direct capacity measurement 27
10.3.3 Air side calorimeter 27
10.3.4 Confirming method 28

11 Conversion to Standard Conditions 28
11.1 General 28
11.1.1 Introduction 28
11.1.2 Correction for atmospheric pressure 28
11.1.3 Standard capacity 28
11.2 Nominal air flow 28
11.3 Nominal fan power 28

12 Test report 29

Annex A (normative) Flow meter method 30

Annex B (informative) Low pressure calorimeter 32

Annex C (informative) Air-Side calorimeter 33

Annex D (informative) Procedure to measure the oil content 34

Bibliography 35