# CASCADA FRESH WATER VERTICAL BUFFER TANK (COUNTER FLOW)

The **Cascada Fresh Water Vertical Buffer Tank (Counter Flow)** is the new compact solution for **FRESH WATER** production (In-line water heating) and heating.

It can be thermally supplied by many heat sources such as Solar Field, Heat Pump, Boiler and Heating Element.

System operation can be fully automated via PLC with real-time display provided via touch screen or computer.

This product series is suitable for small-scale hotel applications and residences with increased Domestic Hot Water (DHW) demand.

# PRODUCT MODELS

## With solar heat exchanger

| MODEL | CASCADA BF VER-FW-CF-S 300/10 | CASCADA BF VER-FW-CF-S 300/15 | CASCADA BF VER-FW-CF-S 600/15 | CASCADA BF VER-FW-CF-S 600/20 | CASCADA BF VER-FW-CF-S 1000/30 | CASCADA BF VER-FW-CF-S 1000/45 |
|---|---|---|---|---|---|---|
| Nominal Flow Rate (lt/min) | 17 | 25 | 25 | 33 | 50 | 75 |
| Nominal Flow Rate ($m^3$/h) | 1.0 | 1.5 | 1.5 | 2.0 | 3.0 | 4.5 |
| Nominal Useful Power (kW)* | 35 | 53 | 52 | 70 | 105 | 157 |
| Tank Capacity (lt) | 300 | 300 | 600 | 600 | 1000 | 1000 |
| Solar Heat Exchanger Area ($m^2$) | 1.0 | 1.0 | 1.4 | 1.4 | 2.0 | 2.0 |
| Height (mm) | 1680 | 1680 | 2020 | 2020 | 2105 | 2105 |
| Diameter (mm) | 690 | 690 | 810 | 810 | 1030 | 1030 |
| Weight (kg) | 82 | 82 | 112 | 112 | 170 | 170 |
| *(Primary circuit temperatures : 60-55°C, Secondary circuit temperatures: 20-50°C) | | | | | | |

## Without solar heat exchanger

| MODEL | CASCADA BF VER-FW-CF 300/10 | CASCADA BF VER-FW-CF 300/15 | CASCADA BF VER-FW-CF 600/15 | CASCADA BF VER-FW-CF 600/20 | CASCADA BF VER-FW-CF 1000/30 | CASCADA BF VER-FW-CF 1000/45 |
|---|---|---|---|---|---|---|
| Nominal Flow Rate (lt/min) | 17 | 25 | 25 | 33 | 50 | 75 |
| Nominal Flow Rate ($m^3$/h) | 1.0 | 1.5 | 1.5 | 2.0 | 3.0 | 4.5 |
| Nominal Useful Power (kW)* | 35 | 53 | 52 | 70 | 105 | 157 |
| Tank Capacity (lt) | 300 | 300 | 600 | 600 | 1000 | 1000 |
| Height (mm) | 1680 | 1680 | 2020 | 2020 | 2105 | 2105 |
| Diameter (mm) | 690 | 690 | 810 | 810 | 1030 | 1030 |
| Weight (kg) | 78 | 78 | 107 | 107 | 165 | 165 |
| *(Primary circuit temperatures : 60-55°C, Secondary circuit temperatures: 20-50°C) | | | | | | |

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| TECHNICAL SPECIFICATIONS | |
|---|---|
| **Buffer tank material** | INOX 304 |
| **Buffer tank insulation** | Polyurethane foam (thickness: 90-100 mm, density: 45 kg/m$^3$) |
| **Outer casing** | PVC leather |
| **Buffer tank welding type** | Automatic circular welding |
| **Buffer tank protection** | Inactivation coating |
| **Buffer tank nominal operating pressure** | 3 bar |
| **Buffer tank maximum operating pressure** | 4 bar |
| **Buffer tank test pressure** | 8 bar |
| **Energy classification** | B |
| **Fresh water heat exchanger type** | Counter flow, Corrugated |
| **Fresh water heat exchanger material** | INOX 316L |
| **Fresh water heat exchanger welding type** | Automatic circular welding |
| **Fresh water heat exchanger protection** | Inactivation coating |
| **Secondary circuit nominal operating pressure** | 6 bar |
| **Secondary circuit maximum operating pressure** | 12 bar |
| **Primary circuit nominal operating pressure** | 3 bar |
| **Primary circuit maximum operating pressure** | 6 bar |
| **Nominal operating temperature** | 95°C |
| **Heat transfer pump** | Wilo 0-10V / Grundfos PWM |
| **Solar field heat exchanger** | Immersed, corrugated |
| **Solar field heat exchanger material** | INOX 304 |
| **Solar field heat exchanger nominal operating pressure** | 3 bar |
| **Solar field heat exchanger maximum operating pressure** | 6 bar |
| **Automation control system (extra)** | Control panel THALES AK400 with 4.3” touch screen |

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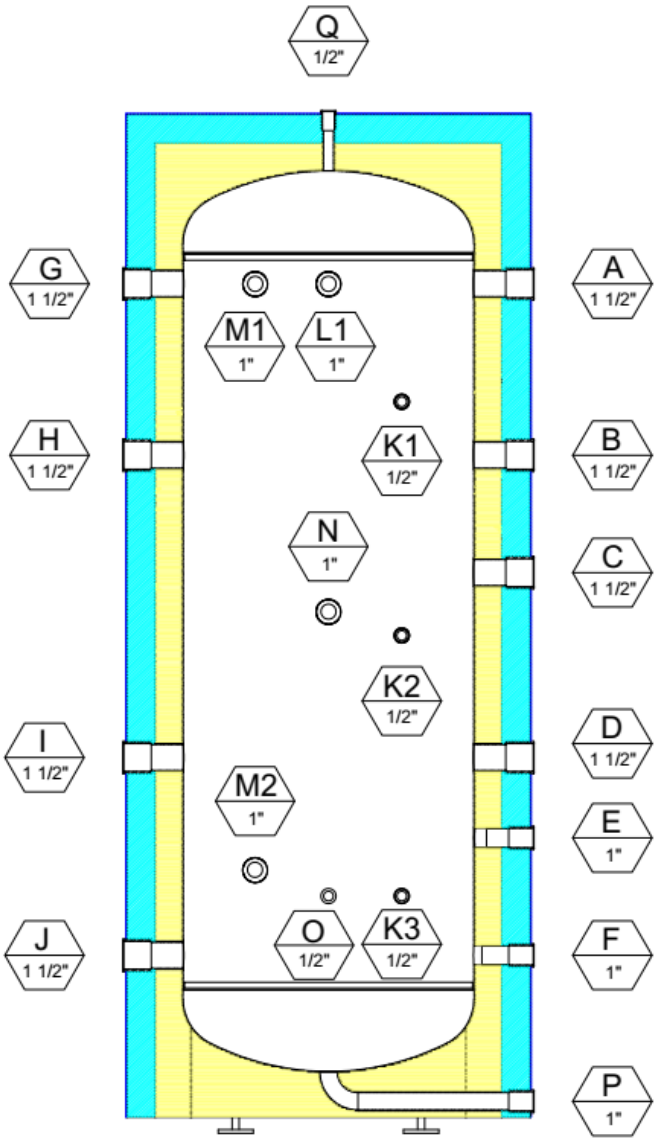
# NOMENCLATURE AND HOLES DIAMETERS




| CASCADA BF VER-FW-CF-S 300 INOX/LR | | |
|---|---|---|
| Hole | Nozzle size | Description |
| A | 1 1/2" | HEATING IN |
| B | 1 1/2" | ANODE |
| C | 1 1/2" | HEATING ELEMENT |
| D | 1 1/2" | HEATING RETURN |
| E | 1" | FROM SOLARS |
| F | 1" | TO SOLARS |
| G | 1 1/2" | HEATING IN |
| H | 1 1/2" | HEATING IN |
| I | 1 1/2" | HEATING RETURN |
| J | 1 1/2" | HEATING RETURN |
| K1 | 1/2" | SENSOR |
| K2 | 1/2" | SENSOR |
| K3 | 1/2" | SENSOR |
| L1 | 1" | FROM PUMP |
| M1 | 1" | HOT WATER |
| M2 | 1" | COLD WATER |
| N | 1" | TO PUMP |
| O | 1/2" | FILLING WATER |
| P | 1" | DRAIN |
| Q | 1/2" | AIR RELIEF |

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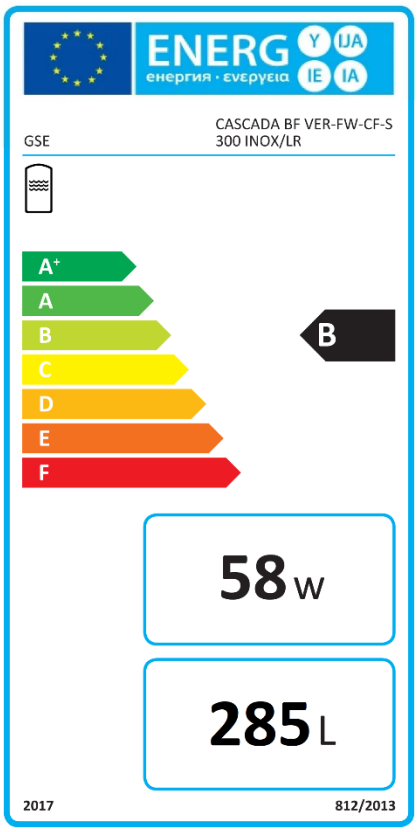
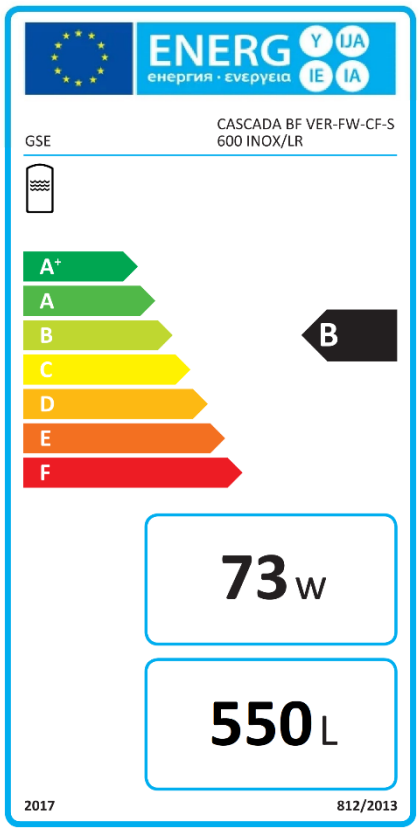
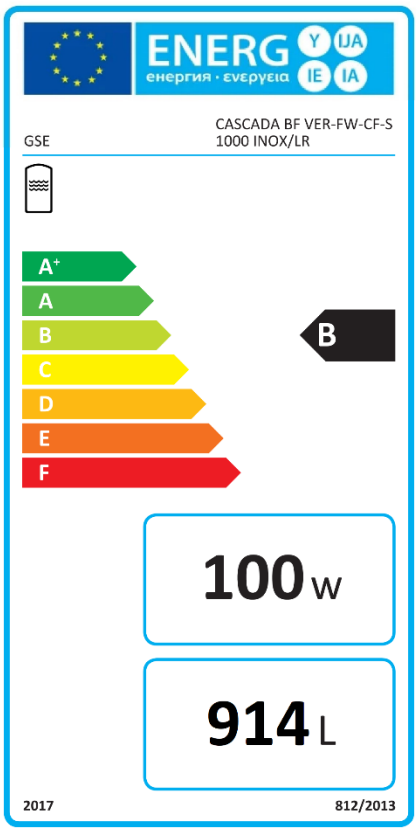
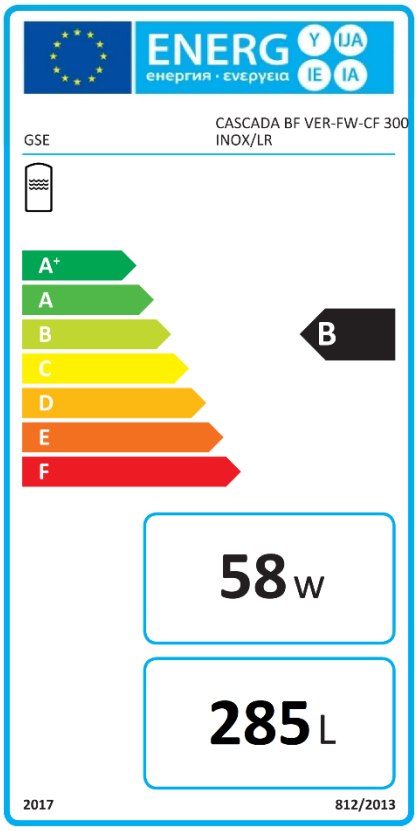
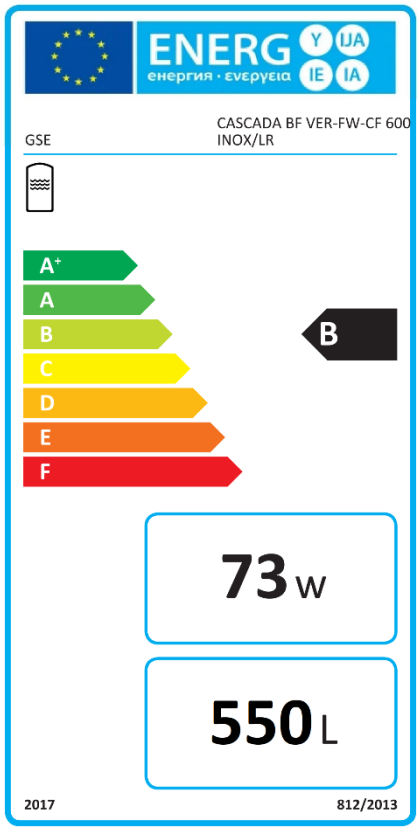
# ENERGY LABELS

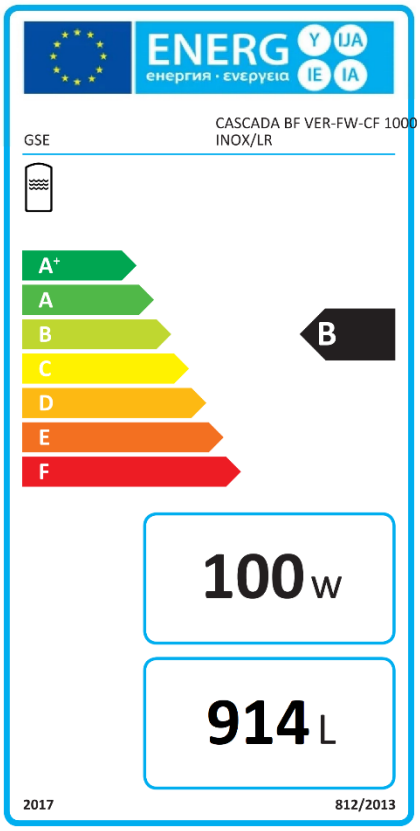
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# QUALITY CHARACTERISTICS

| QUALITY CHARACTERISTIC | BENEFIT |
|---|---|
| **In Line** heating of domestic hot water | ***It prevents the incubation of Legionella bacteria***<br>***Maximizes the lifetime of the installation*** |
| **Relatively low temperature difference** between primary and secondary circuit **(max 5°C)** | ***Low charging temperatures***<br>***Low operating cost*** |
| Design based in **patent (Innovative control)** | ***High energy efficiency***<br>***Constant supply of water at the desired temperature***<br>***Minimum pressure drop in the water supply*** |
| **High density polyurethane insulation** | ***Negligible thermal losses during operation***<br>***Energy classification: B*** |
| **Full compatibility** with existing hot water production and heating systems | ***Utilization of existing equipment and systems*** |
| **Avoiding scale build-up** due to its **innovative design** | ***Long lifecycle of the heat exchanger***<br>***Stable and reliable operation*** |
| **Reverse flow cleaning** | ***Easy and quick cleaning*** |
| **Small size** and **ergonomic design** | ***Easy installation and space saving in engine rooms*** |

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# AUTOMATION CONTROL SYSTEM THALES AK400 FUNCTIONS


| FUNCTIONS | Default | Potential |
|---|---|---|
| Control and operation via integrated 4.3'' touch screen | √ | |
| Visualize system operations in real time | √ | |
| Domestic hot water temperature control (set point 1, time-schedule) | √ | |
| Heat pump control (Remote on/off with time-schedule, tank temperature adjustment set point 2) | √ | |
| Boiler control (built-in relay with time-schedule, tank temperature adjustment set point 3) | √ | |
| Variable speed water pump control (PWM/0-10V) for energy transfer | √ | |
| Control of a second variable speed water pump (PWM/0-10V) for energy transfer | | √ |
| Solar Field Control with Variable Speed Water Pump (PWM/0-10V) | | √ |
| Future firmware upgrades | | √ |

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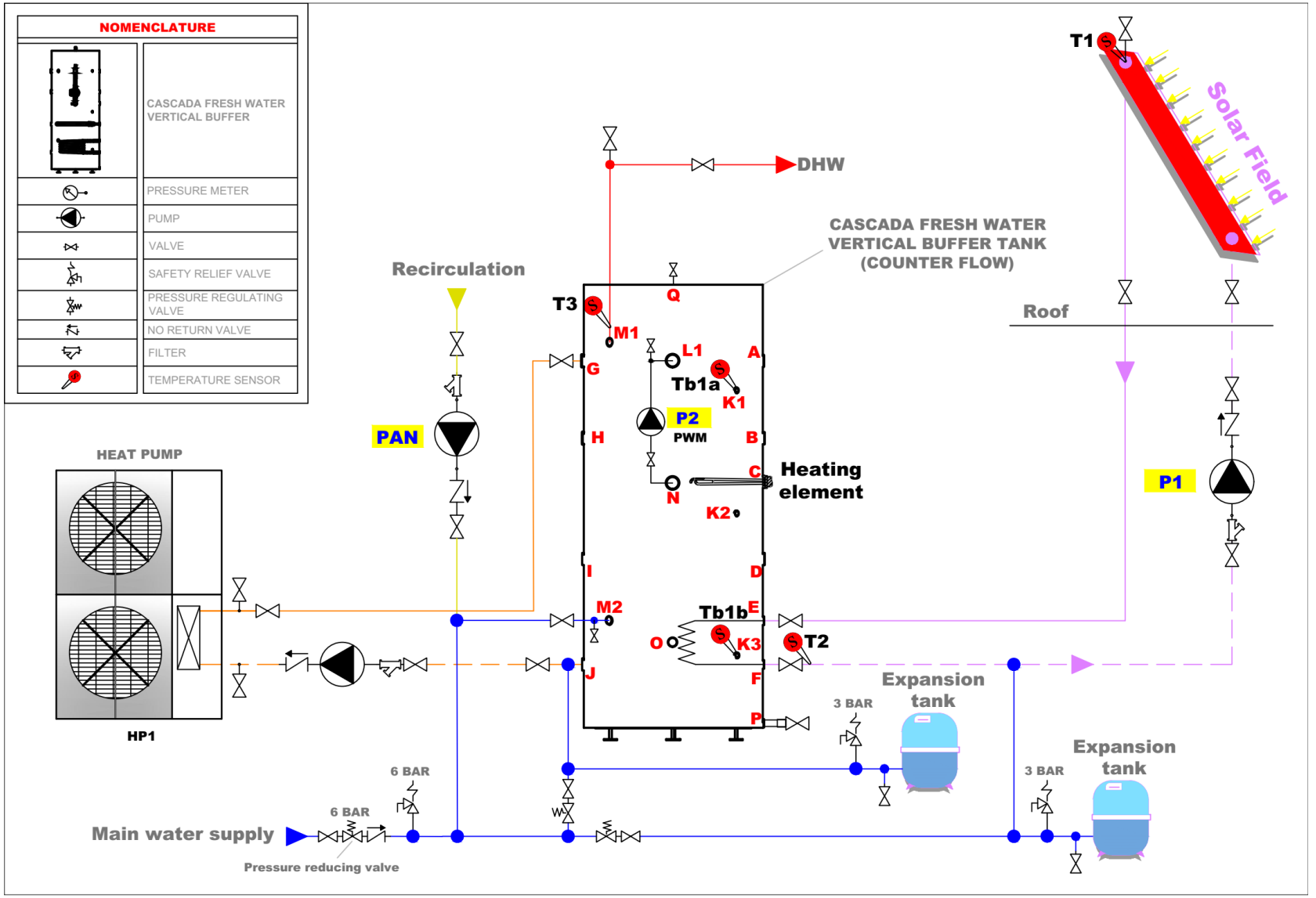
# PIPING AND INSTRUMENTATION DIAGRAM (PID)





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# TEMPERATURE AND PRESSURE DROP CHARTS

## Example of calculating the minimum required tank charging temperature

Suppose the supply we need is 18 lt/min. For the production of 50°C Domestic Hot Water (DHW) and a supply of 18 lt/min (see Figure 1), going vertically downwards we see that the required tank charging temperature must be at least 52.7°C (see Figure 1).

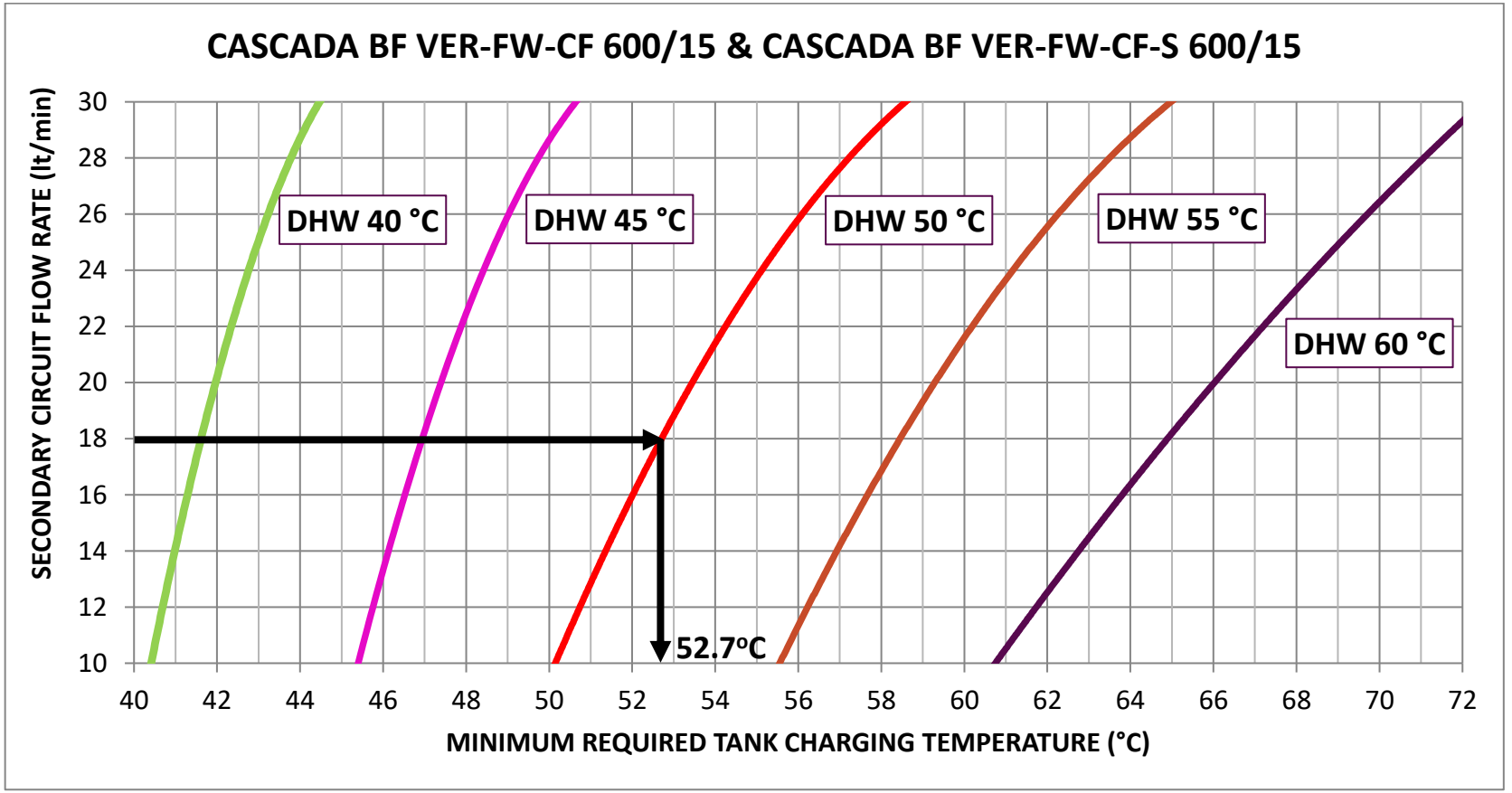


Figure 1

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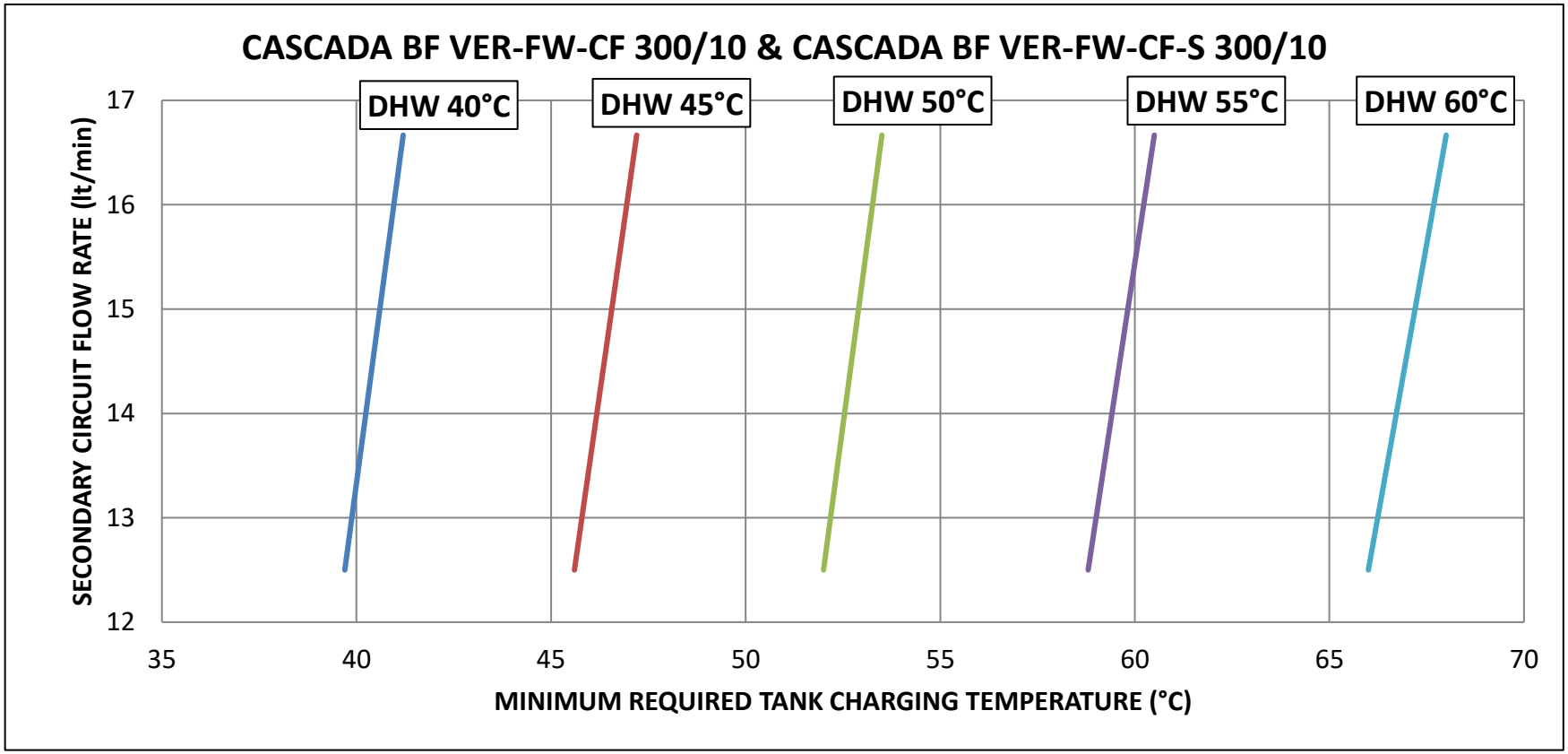
# 1) CASCADA BF VER-FW-CF 300/10 & CASCADA BF VER-FW-CF-S 300/10

| DHW flow rate (lt/min) | DHW temperature (°C) | Minimum tank charging temperature (°C) | Pressure drop (bar) |
|---|---|---|---|
| 15 | 50 | 53 | 0.26 |




i) Minimum required primary circuit temperature as a function of the secondary circuit flow rate and the desired DHW temperature

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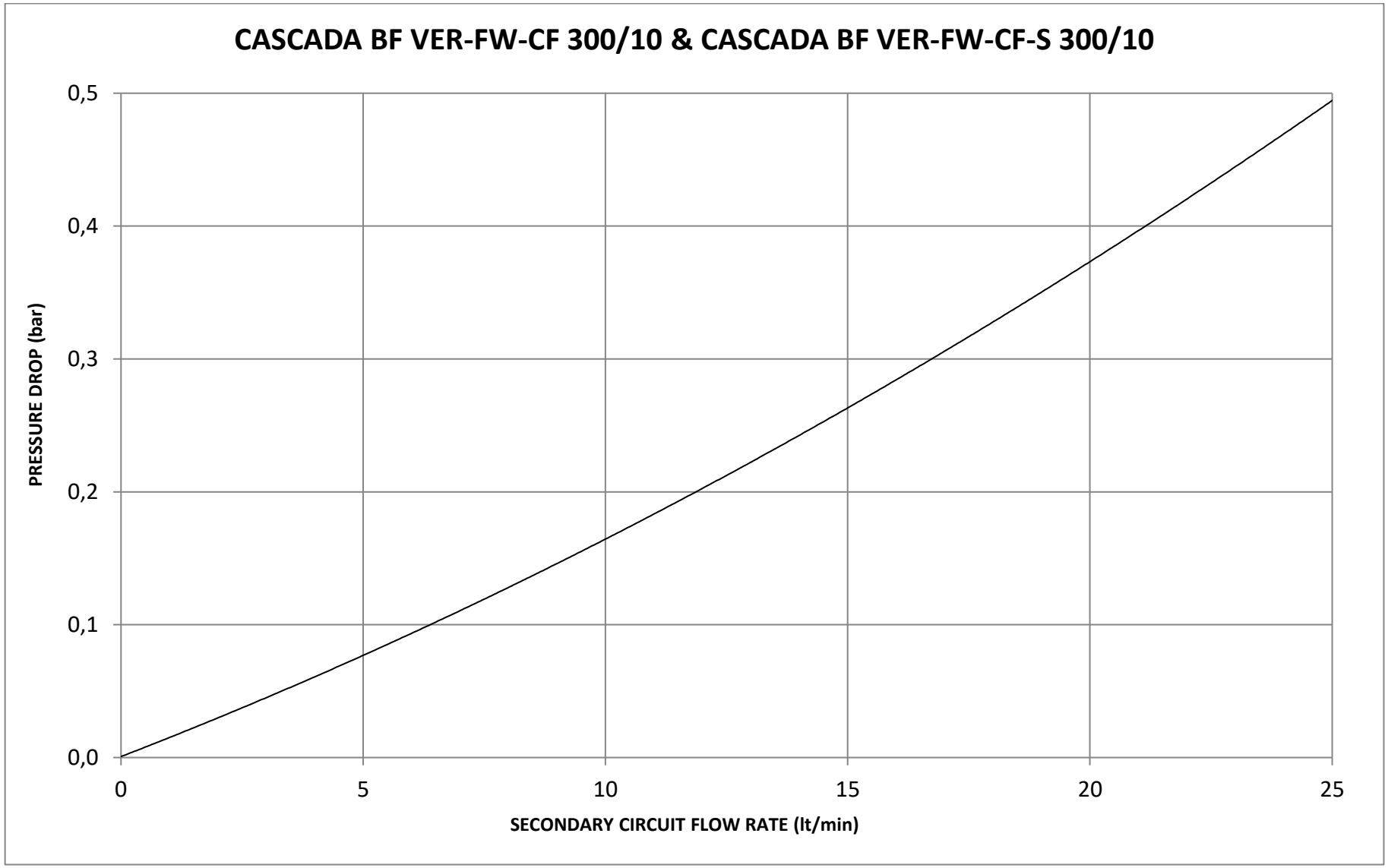


ii) Secondary circuit (DHW) pressure drop diagram

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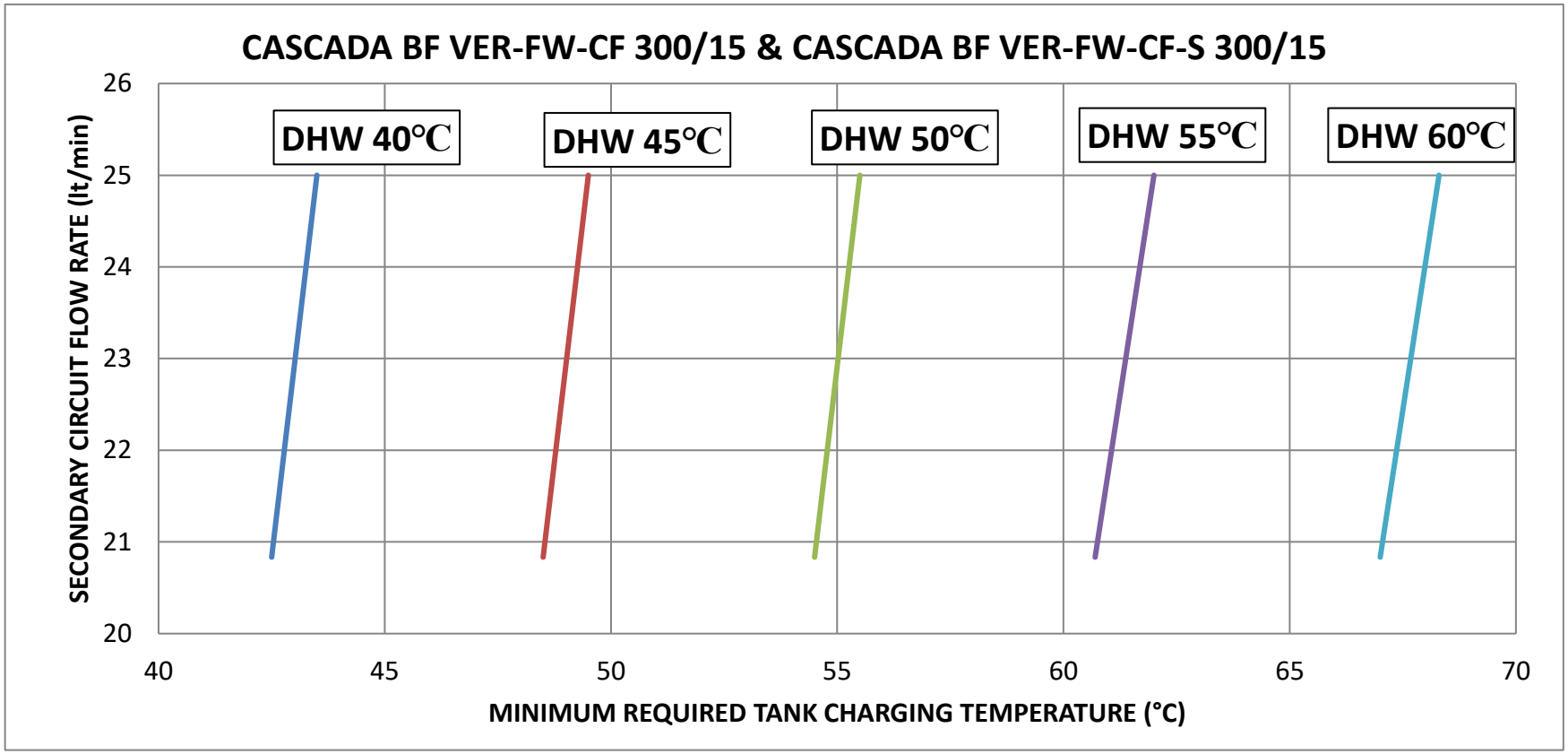
## 2) CASCADA BF VER-FW-CF 300/15 & CASCADA BF VER-FW-CF-S 300/15

| DHW flow rate (lt/min) | DHW temperature (°C) | Minimum tank charging temperature (°C) | Pressure drop (bar) |
|---|---|---|---|
| 23 | 50 | 55 | 0.44 |




i) Minimum required tank charging temperature as a function of the secondary circuit flow rate and the desired DHW temperature

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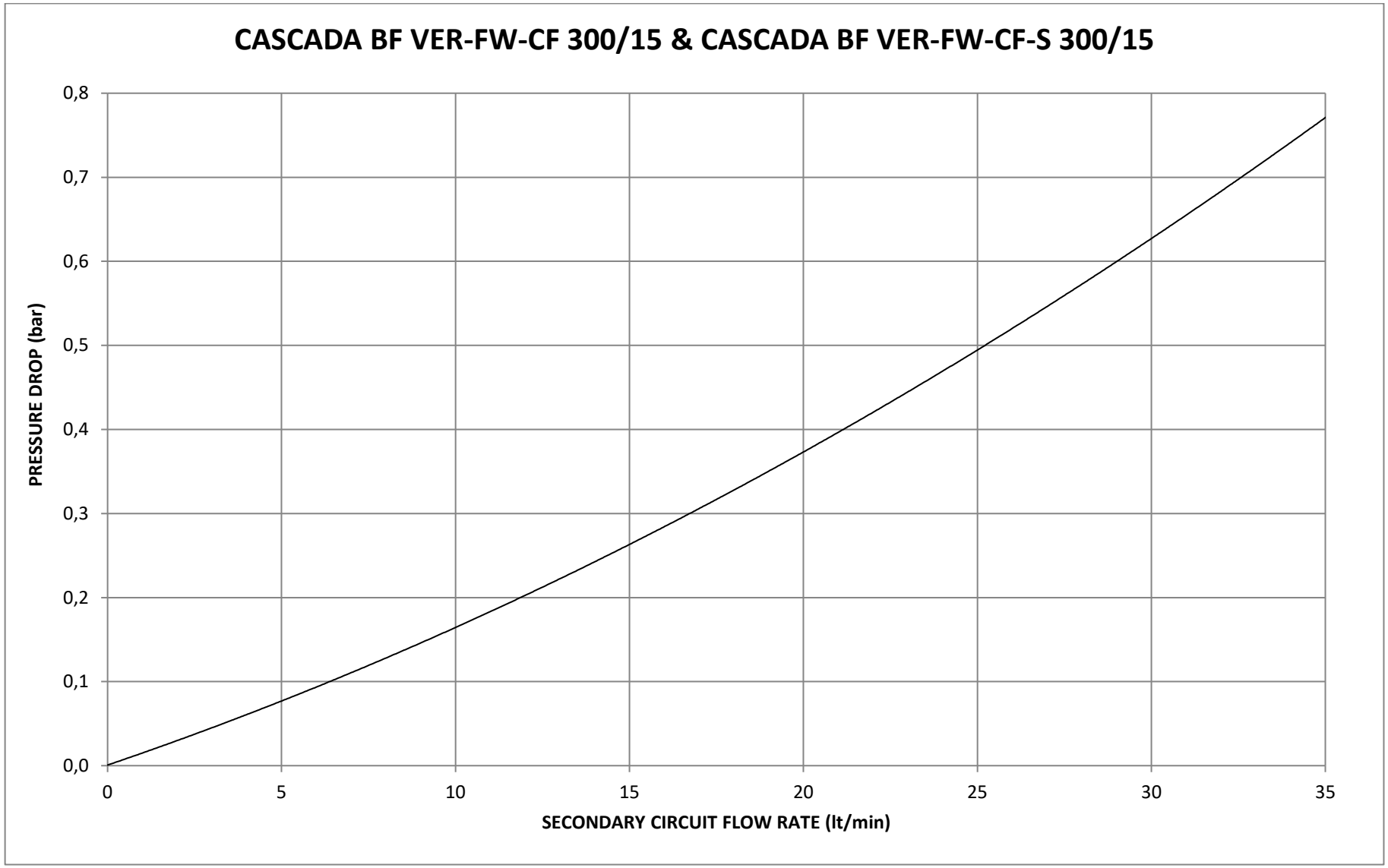


ii) Secondary circuit (DHW) pressure drop diagram

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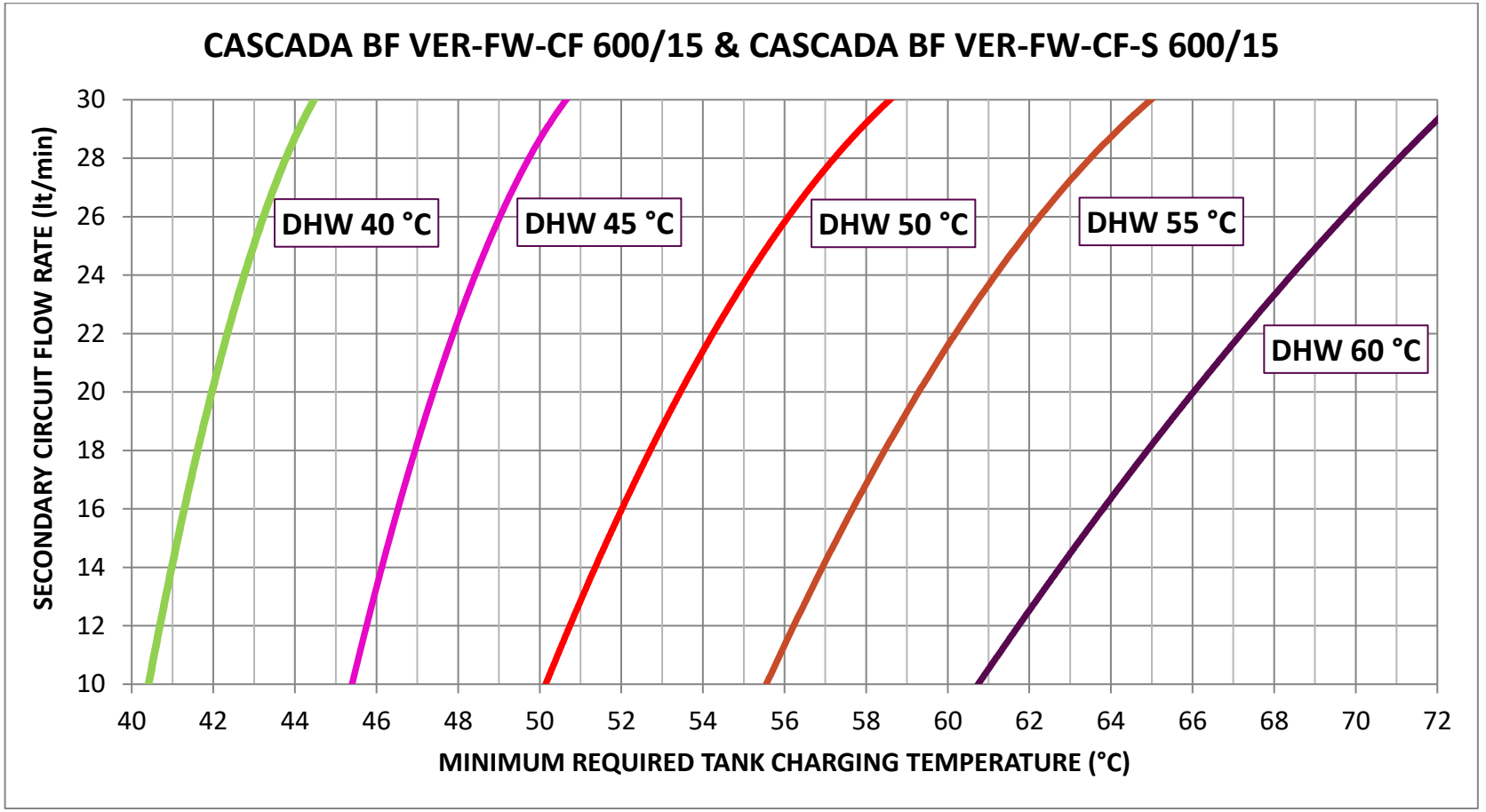
# 3) CASCADA BF VER-FW-CF 600/15 & CASCADA BF VER-FW-CF-S 600/15

| DHW flow rate (lt/min) | DHW temperature (°C) | Minimum tank charging temperature (°C) | Pressure drop (bar) |
|---|---|---|---|
| 25 | 50 | 55 | 0.20 |




i) Minimum required tank charging temperature as a function of the secondary circuit flow rate and the desired DHW temperature

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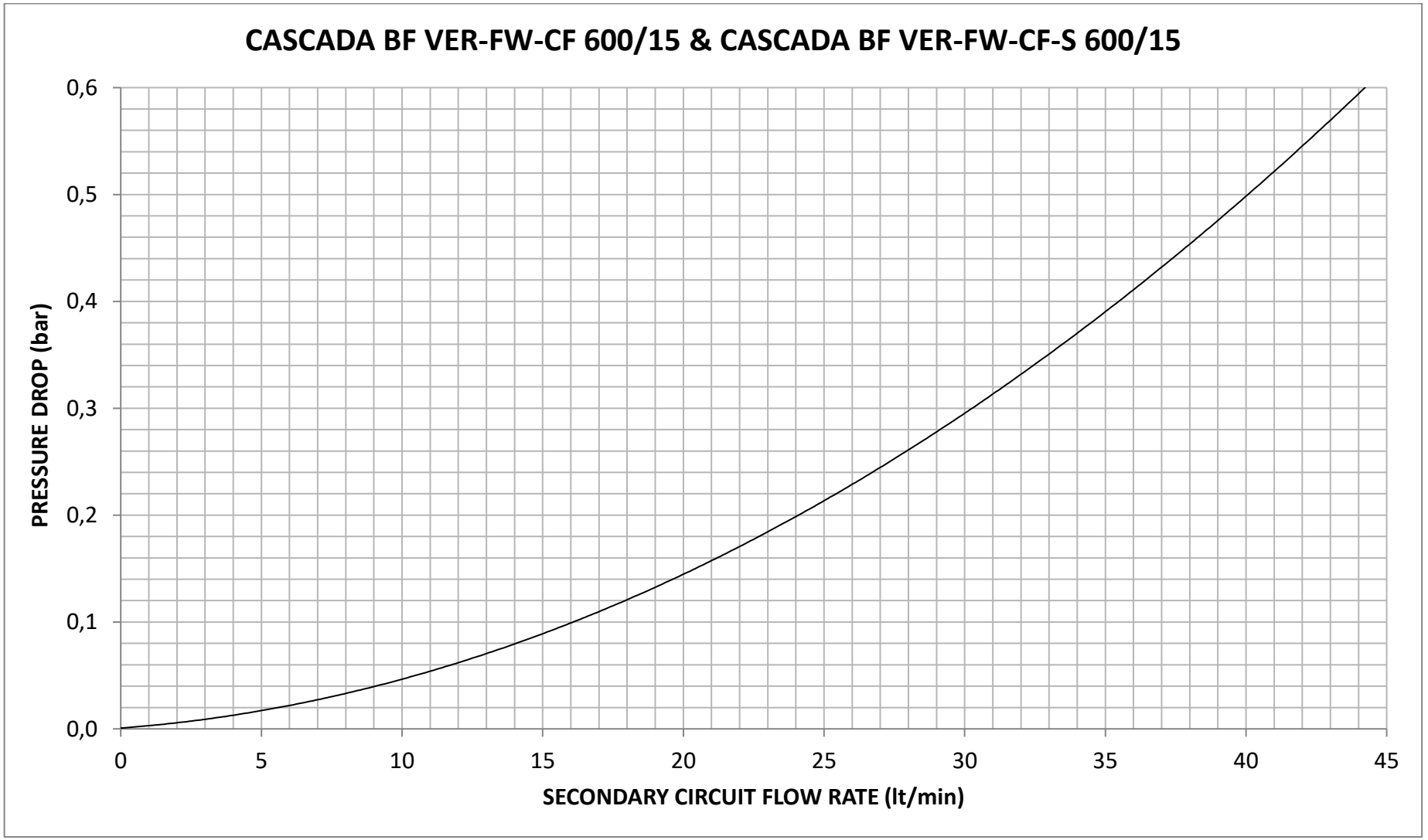


ii) Secondary circuit (DHW) pressure drop diagram

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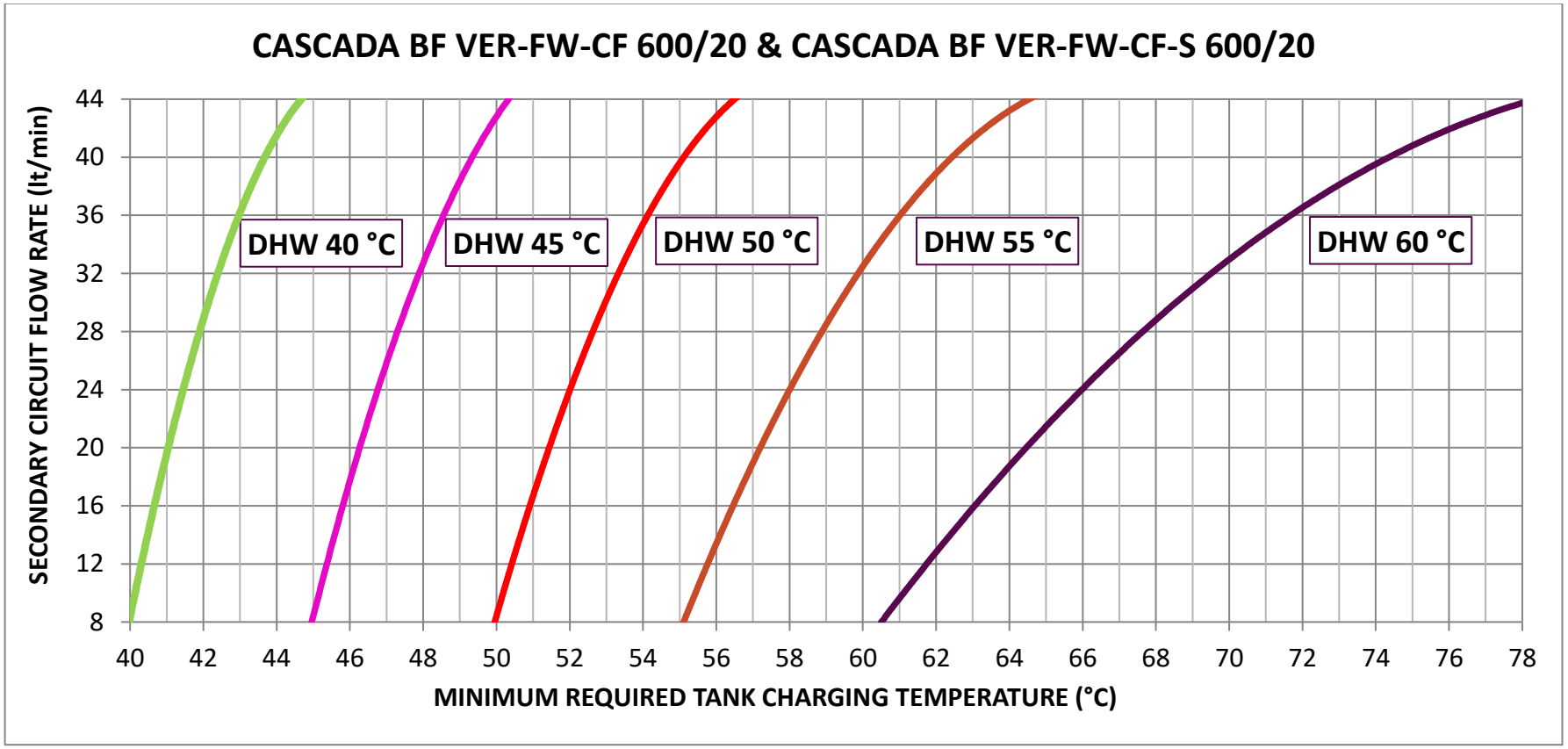
# 4) CASCADA BF VER-FW-CF 600/20 & CASCADA BF VER-FW-CF-S 600/20

| DHW flow rate (lt/min) | DHW temperature (°C) | Minimum tank charging temperature (°C) | Pressure drop (bar) |
|---|---|---|---|
| 33 | 50 | 53.5 | 0.36 |




i) Minimum required tank charging temperature as a function of the secondary circuit flow rate and the desired DHW temperature

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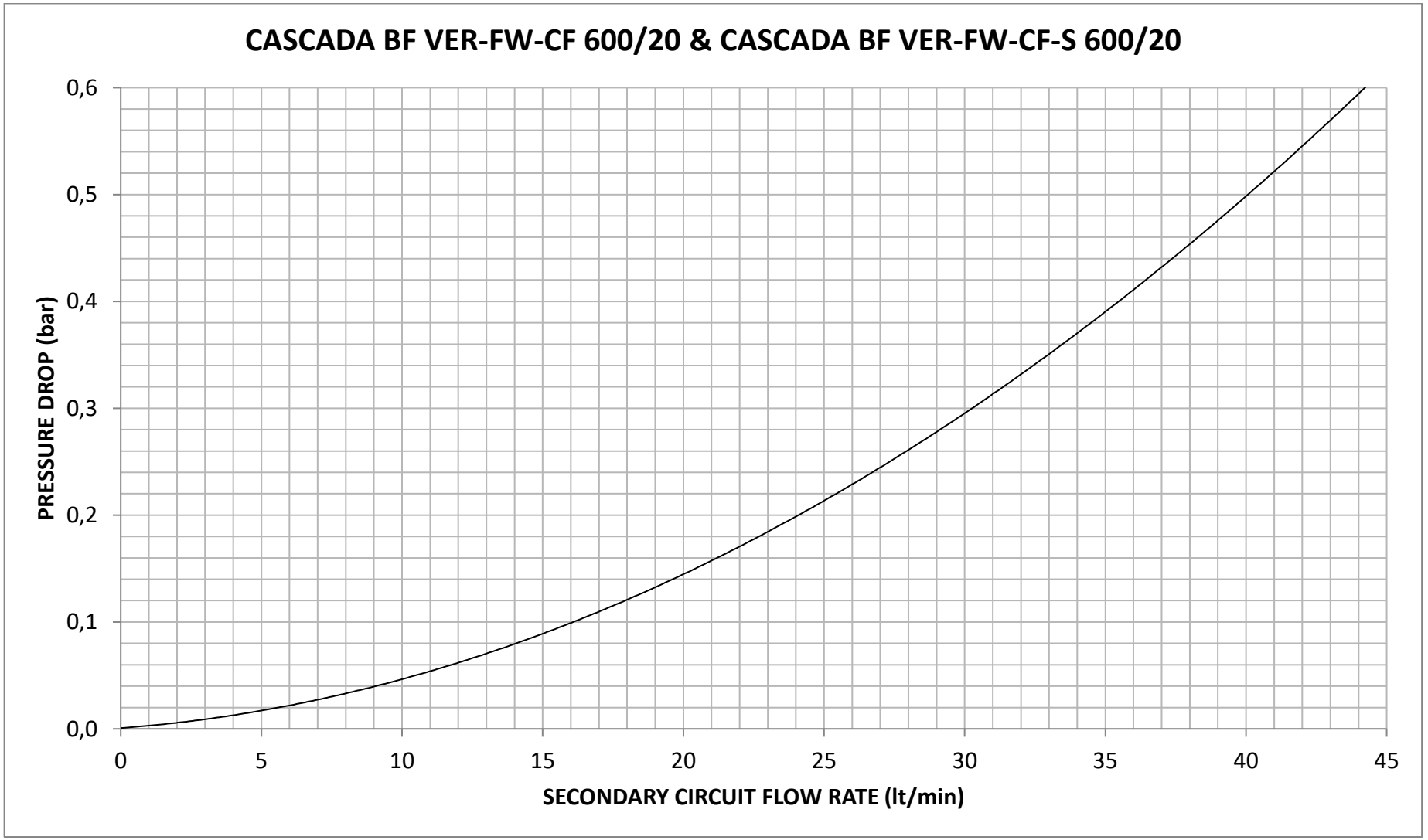


ii) Secondary circuit (DHW) pressure drop diagram

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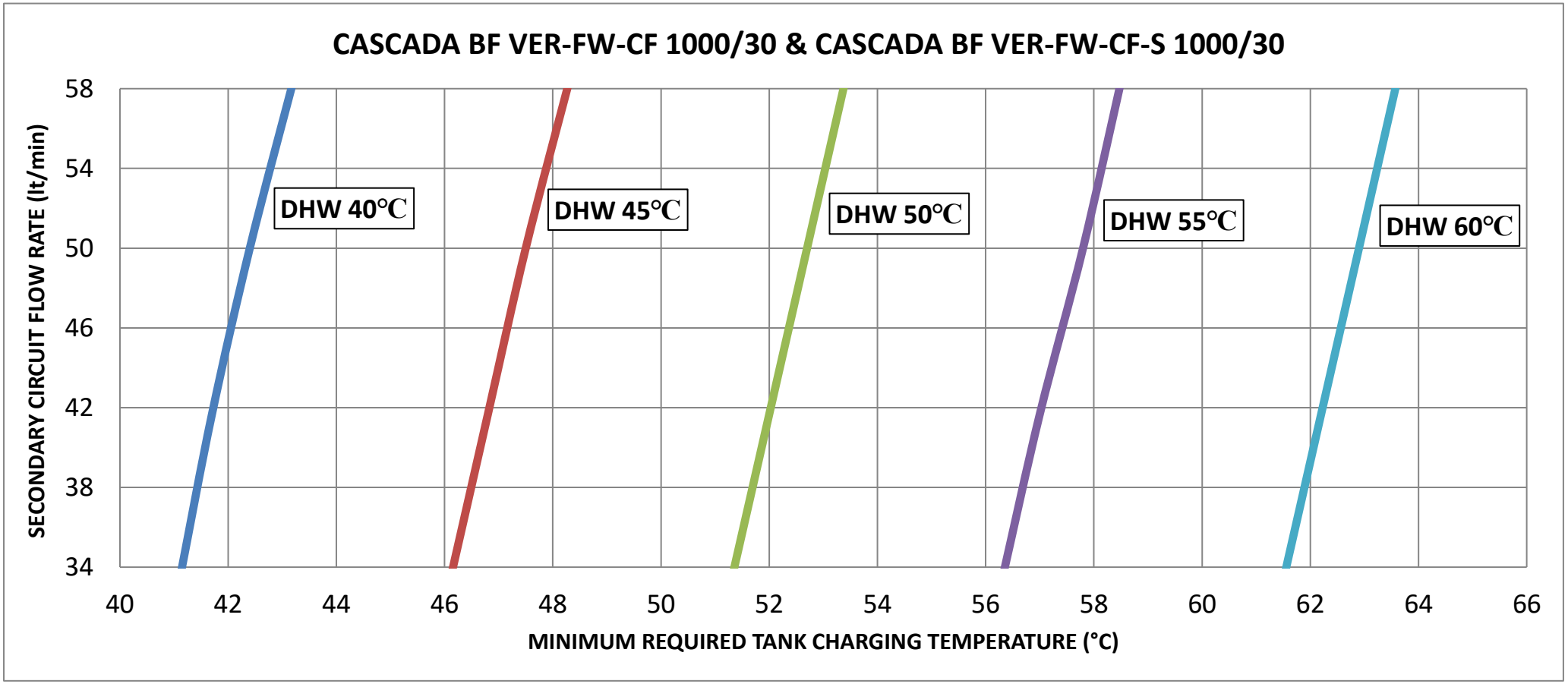
# 5) CASCADA BF VER-FW-CF 1000/30 & CASCADA BF VER-FW-CF-S 1000/30

| DHW flow rate (lt/min) | DHW temperature (°C) | Minimum tank charging temperature (°C) | Pressure drop (bar) |
|---|---|---|---|
| 50 | 50 | 52.7 | 0.18 |




i) Minimum required tank charging temperature as a function of the secondary circuit flow rate and the desired DHW temperature

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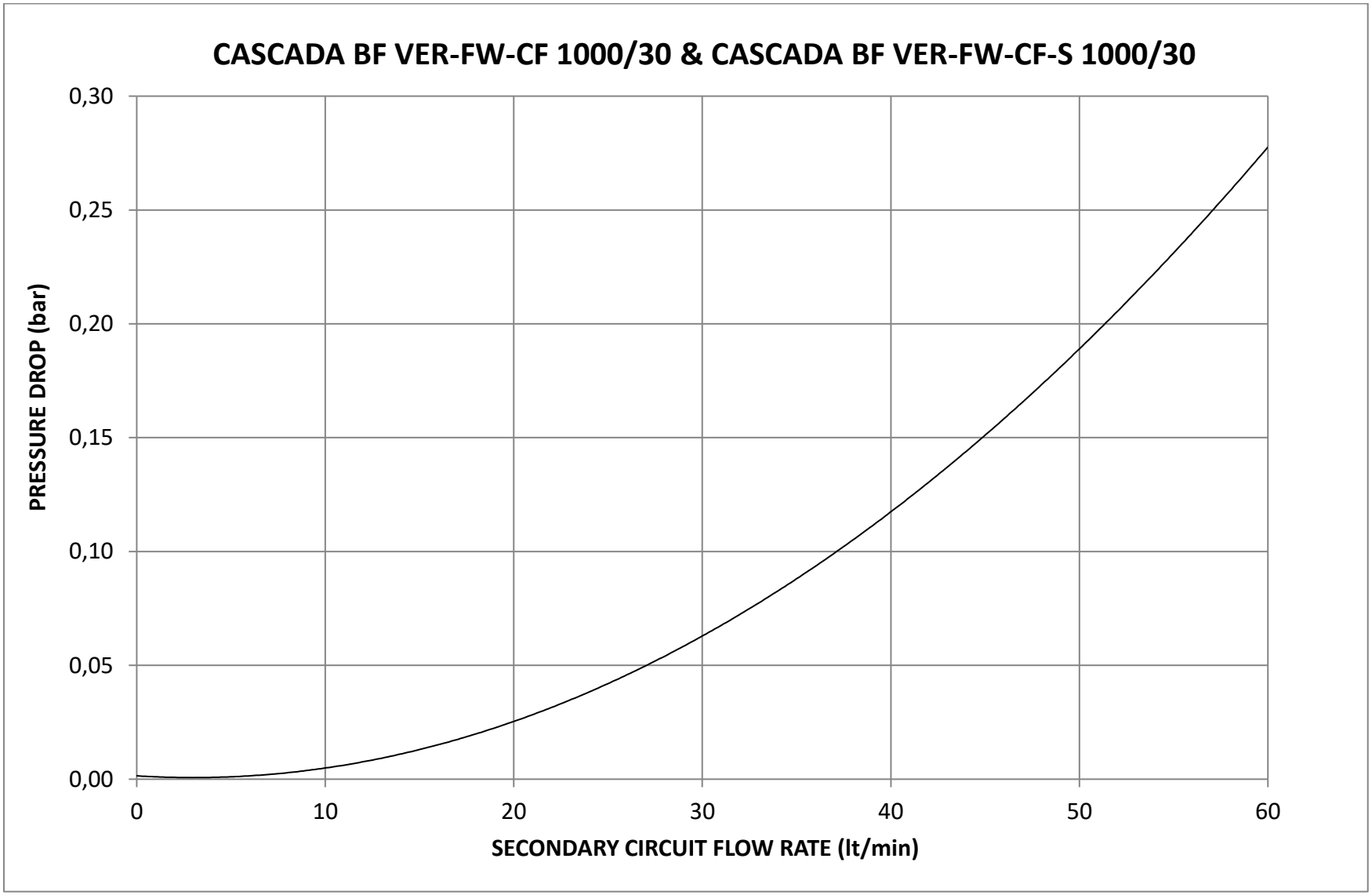


ii) Secondary circuit (DHW) pressure drop diagram

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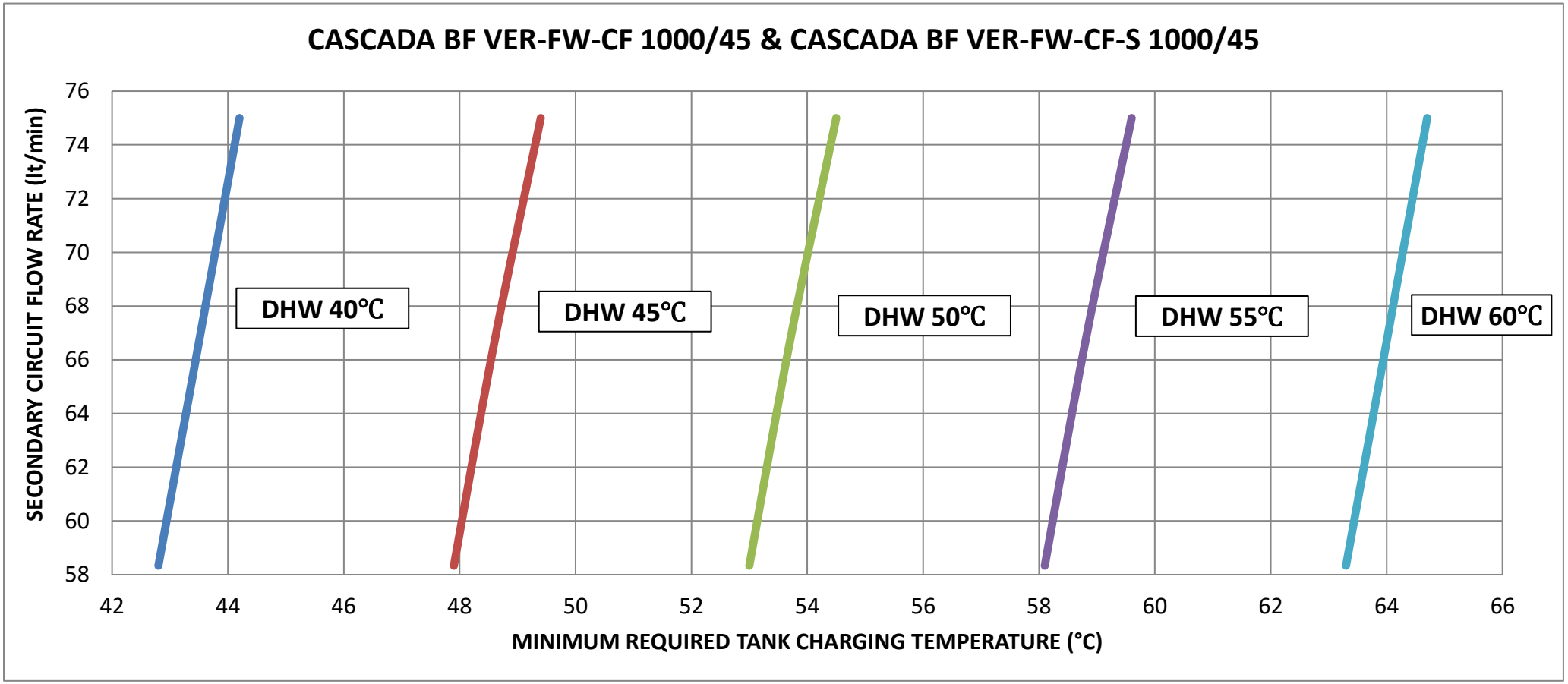
# 6) CASCADA BF VER-FW-CF 1000/45 & CASCADA BF VER-FW-CF-S 1000/45

| DHW flow rate (lt/min) | DHW temperature (°C) | Minimum tank charging temperature (°C) | Pressure drop (bar) |
|---|---|---|---|
| 70 | 50 | 54 | 0.38 |




i) Minimum required tank charging temperature as a function of the secondary circuit flow rate and the desired DHW temperature

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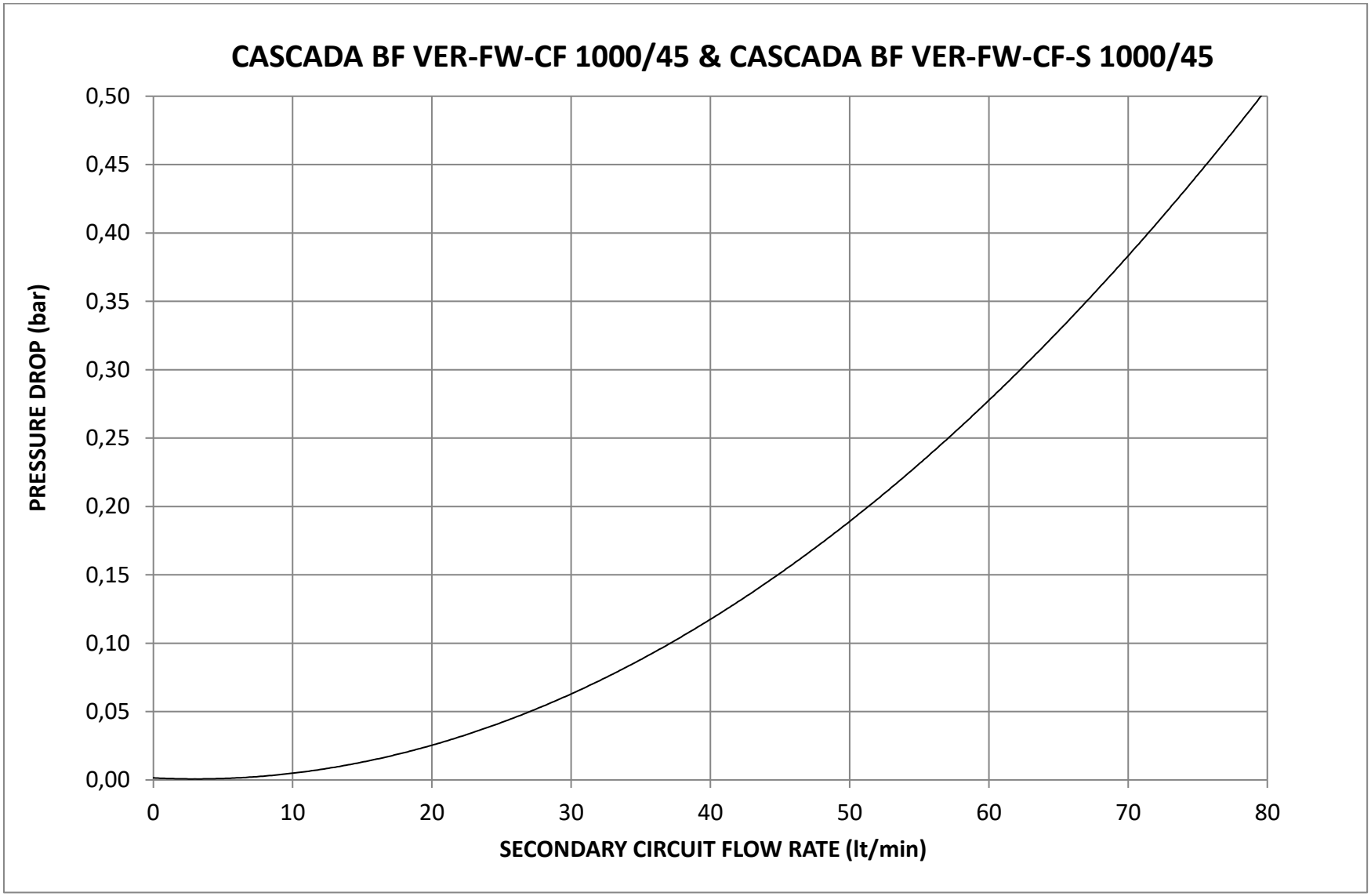


ii) Secondary circuit (DHW) pressure drop diagram

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