

Atlas Copco



# Hybrid Industrial Cooling Chiller

TCA 55-215



# *Introduction*

TCA 55-215

Hybrid Industrial Cooling Chiller

## **Plug'n'play solution for process cooling systems**

Atlas Copco TCA55-215 series is a hybrid plug'n'play water chiller. Its specificities include a free-cooling section and adiabatic pre-cooling (patented adiabatic system) on inlet. The cooling capacity ranges from 55 to 228 kW. Reliable and robust, equipped with proved scroll compressors, air-cooled microchannel condensers and integrated hydro module, it provides easy and cost-effective installation and maintenance and safety for your day-to-day operations.

### **Maximum energy efficiency**

Atlas Copco TCA55-215A's range fully complies with the Eco Design Directive 2021 meeting the Seasonal Energy Performance Ratio (SEPR1) to reach the highest level of energy saving.

Using energy-efficient equipment made by Atlas Copco, you reduce production costs and increase the competitiveness of your company.

### **Variety of industrial applications**

The components of the chiller allow it to be used in a wide range of applications and across industrial sectors. The use of a shell'n'tube evaporator enables to achieve the highest level of reliability with various types of processes in both closed and open hydraulic circuits. All configurations can have a built-in hydro circuit with buffer atmospheric tank and single or double (work/stand-by) pumps with a wide range of working pressures (1, 3, 5 bar). The list of applicable segments includes, but is not limited to, mechanical engineering, all types of metalworking, food and beverages, pharmaceuticals, cement industry, chemistry and petrochemistry, oil and gas industry, cooling of data centers and telecommunication hubs, plastic production of all types.

### **For indoor and outdoor installation**

TCA55-215 series chillers can be installed both indoors and outdoors, thanks to the use of the necessary reliable components with IP54 protection. This enables to save internal space, optimize the distribution of cooling water and allows the chiller to work with air temperature. It is especially efficient during winter to make use of the cold air to gain efficiency with free-cooling coils.

# Reliability



## Speed-Regulated Axial Fans

Industry-standard level of efficiency and lower cost with phase-cut regulation (std for TCA-A)  
Premium efficiency level with EC brushless fans to ideally meet partial loads for your industrial application.  
Standard for TCA-AF, -AD, -P versions and optional for TCA-A version.

## Elektronikon MarkV Touch with Smartlink

Proven algorithms provide operational efficiency for the whole range.  
You can always track the machine status and working parameters using Atlas Copco Smartlink connection.  
Built-in set of safety options like phase sequence relay provides ultimate protection and reduced risk of malfunction.

## **Microchannel Condensers with Epoxy Coating**

Immune to galvanic corrosion.  
Light-weighted with a high rate of heat transfer.  
Provides lower cost of maintenance with reduced refrigerant charge.

## **Free-Cooling Coils**

Saves up to 40% of the chillers energy compared to non-free cooling units.  
Integrated solution for easy installation and smaller footprint.  
Optimal balance between clogging-free water flow, heat transfer and life-cycle cost with this tube-fin free-cooling heat exchanger.  
Total free-cooling starting from deltaT of 5,5 degrees with the set-point of 15 degrees.

## **Insulated On-board Water Tank**

Closed atmospheric for a wide range of applications.  
Protected continuous operation with a set of onboard safety devices.

## **Refrigerant circuit with Hermetic Scroll Compressors**

Twin refrigerant circuit for redundancy.  
Electronic expansion valve (EEV) as standard option for highest energy efficiency, flexibility and time saving during maintenance.  
Continuous uptime and perfect serviceability with the industry-standard scroll compressor.  
Option of low-noise jacket for sensitive applications.

## **Pumps with stainless-steel impeller**

Vast range of configurations with maximum available pressures of 1, 3 or 5 bar to meet the variety of hydro circuits  
Stand-by pump with automatic switching available in all versions for operation with no interruption  
Impellers made in 316L stainless steel  
IE3 efficiency motor

## **Adiabatic System Pads**

Patented evaporative cooling system provides peak temperature safety during operation.  
Cooling capacity boost up to 17% for dry climatic conditions.  
Durable components in stainless-steel.  
Strainer and water hammer arrestor on inlet as standard.

## **Hydro Connections**

Easy installation with one point of connection.  
Vaste range of connections to meet your needs: BSP and NPT tread, UNI or ASME flanges.  
Easy and fast connection for manual or automatic cooling circuit filling and adiabatic system with 1/2 inch female tread.  
Manual (std) evaporator bypass to prevent chiller from interrupted process water circulation.

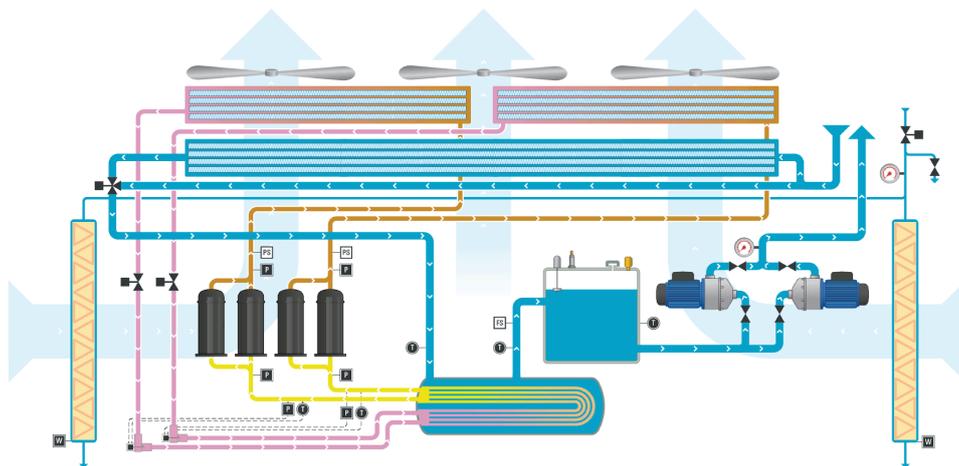
## **Shell-n-Tube Evaporator**

Can withstand long-term temperature loads  
Ideal balance between oil return, heat transfer rate and energy efficiency with two-pass heat exchanger for your cooling process.  
Robust and reliable for any type of industrial application.  
Well-suitable for open circuit.

# Free-Cooling chiller (TCA-AF, -AP) working principle

An industrial chiller with free-cooling consists of the following main elements: compressor (5), condenser (F), evaporator (3), free-cooling coils (4), motorized valve (I).

During operation with ambient temperature higher than set-point the TCA chiller works as an ordinary chiller. Full inlet water flow (1) goes through the motorized valve (I) directly to the evaporator (3).



## 1. Water flow

When operating in ambient temperatures higher than the set-point, the TCA55-215 chiller works as an ordinary chiller. The hot inlet water flow goes through the motorized valve directly to the evaporator.

After passing the evaporator, the water flow goes into a water tank containing a set of safety sensors. It then flows to a pump group, which consists of one or two pumps with outlet pressure versions of 1, 3 or 5 bar bringing cooled water to the application.

An external temperature sensors, allows the switch to free-cooling. When the ambient air temperature drops to a lower temperature, the motorized valve allows the inlet water flow water to run through the free cooling system. Lower ambient air temperature is more energy efficient to cool the water in the system by running it through the tube-fin heat exchanger.

When the ambient temperature, goes even lower, the motorized valve continues to lead the whole inlet flow to the free-cooling heat exchanger, the heat-transfer then goes in a total free-cooling mode.

## 2. Refrigerant flow

When the chiller operates using only the mechanical energy of the compressors, the water goes through the motorized valve directly to the evaporator where its temperature is lowered to the desired set-point thanks to the work of the refrigerant circuit.

When the ambient temperature comes closer to the set-point, the chiller starts to work in a partial free-cooling mode. The refrigerant circuit operates with a lowered load based on the water temperature in the tank, to prevent negative impact on the outlet water temperature.

In total free-cooling mode, a built-in free cooling module allows the TCA55-215AF, -AP to take advantage of the low outdoor air temperatures in the water-cooling process. During free-cooling, the compressors are fully at stop, which is highly energy efficient and significantly increases the life of the compressor.

## 3. Air flow

The air inlet is situated on the surface's side of the chiller going through the free-cooling coils and the microchannel condensers. On top of the machine are two speed-regulated axial fans that create an air flow which fully reveal their efficiency, especially during partial loads.

In free-cooling mode the ambient temperature alone is sufficient to decrease the water temperature to the desired set-point. In this case the speed-regulated axial fans are the only consumer of electrical energy.

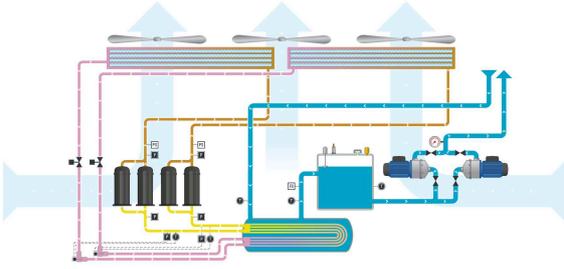
## 4. Adiabatic

Our standard air-cooled chiller has a reduced performance when the ambient temperature rises. Therefore, a chiller must be sized using peak temperatures for the region where it should be installed. A maximum cooling capacity specific for the application should also be taken as an input for calculations. This can lead to higher initial costs as well as more energy consumption and a larger footprint. However, 90% of the time the ambient temperature will be lower than a peak temperature.

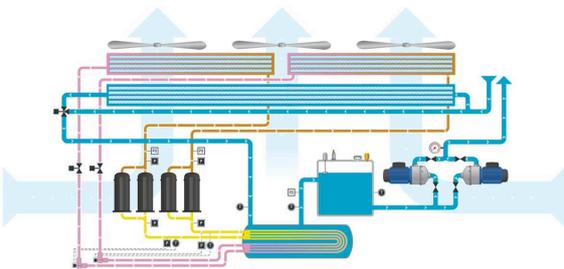
Our TCA-AD and TCA-AP variants offer a solution which allows to decrease inlet cooling air temperature moisturizing it with adiabatic panels situated on both sides of the chiller.

Only when needed, tap water goes into the adiabatic system through an inlet placed on the back side of a chiller together with other water connections and then it is injected on the adiabatic pads.

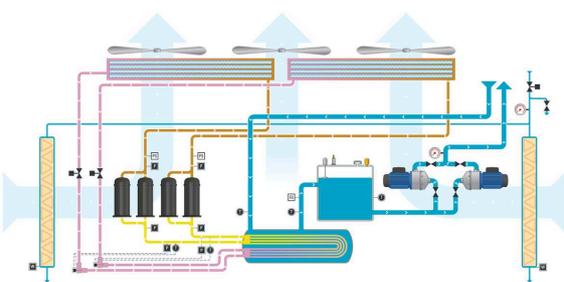
The adiabatic function operates under control of our Elektronikon Mk5S Touch using a patented water consumption control system and control philosophy with the aim to reduce tap water consumption as much as possible without losing the set-point control.



— **TCA - A**  
**Robust industrial chiller**



— **TCA - AF**  
**Industrial Chiller with Integrated Free-Cooling**  
 Saves up to 40% of the chillers energy.



— **TCA - AD**  
**Industrial Chiller with Adiabatic Pre-Cooling**  
 Peak temperature safety and cooling capacity boost up to 17% in dry climate conditions.

# Efficiency

The new Atlas Copco TCA55-215 is a general purpose chiller which can be used in a wide range of applications and industries.



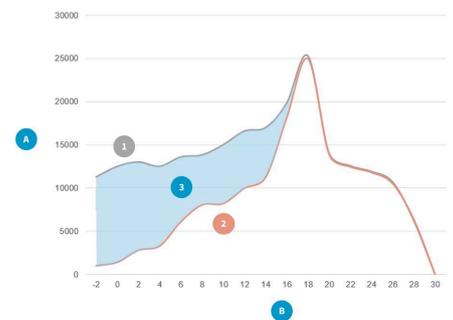
## Wide range of applications

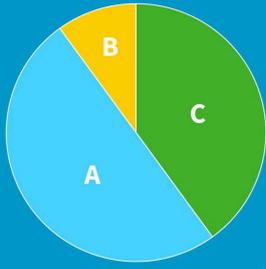
The TCA chiller is applicable for a variety of applications such as the cooling of a photovoltaic power station or a plastic machine, for a telecommunication rig and a chemical bath. This chiller range shows exceptional robustness and efficiency. The free-cooling chiller fully reveals its effectiveness when the outlet water temperature set-point is higher than 12°C, resulting in energy savings up to 40% of the total consumption.

## Total power consumption vs. Temperature during the year

This graph shows the difference between the energy consumption of a free-cooling chiller versus a non-free-cooling variant. When the TCA is operating in free-cooling mode, only the speed-regulated fans are consuming energy and compressors, the main energy consumer for a chiller, are either off or working in a partial load mode. The graph's blue zone shows the direct benefit from using the free-cooling principle.

- A = Kw/h
- B = Degrees C
- 1 = Chiller
- 2 = Free-cooling
- 3 = Free-cooling savings zone





## Free-cooling savings

Atlas Copco's engineering team has many years of experience in designing and calculating complex energy saving equipment. Based on estimations and prepared for different climatic zones, we can state with confidence that the benefits from using an integrated free-cooling TCA55-215 chiller can bring you up to 40% savings of total power consumption for a 5 year life-cycle cost.

A = Electricity

B = Purchase cost

C = 39% Free cooling savings

# Options & scope

TCA 55-215

**Features table TCA 55-215**

Features		TCA 55-215	TCA 55-215AD	TCA 55-215AF	TCA 55-215AP
General	F-gas			R407C	
	GWP			1774	
	IP grade			IP54	
Installation	Lifting with bars + ropes + sprader beam			Standard	
	Forklift			Standard (only for TCA 55-65)	
Electrical	400V/3ph 50Hz IEC			Standard	
	460V/3ph 60Hz IEC (with electrical components UL marked)			Standard	
	400V/3ph 60Hz UL 508A			Standard	
Control	Controller type			Elektronikon MKVS	
	4,3 inch touch screen			Standard	
	Text on display in local language			Standard	
	Day and week scheduler			Standard	
	Service timer			Standard	
	Refrigerant High pressure transmitter (digital)			Standard	
	Refrigerant Low pressure transmitter (digital)			Standard	
	Automatic priority for compressors			Standard	
Compressor direct on line starter (DOL)			Standard		
Safety	Phase sequence motor direction			Standard	
	Thermal-magnetic circuit breakers protection on compressors, pump and fan			Standard	
	High pressure switch with manual reset			Standard	
	Flow switch - paddle type			Standard	
	Low pressure switch - with auto reset (with hysteresis)			Standard	
	Low pressure transmitter - with auto reset (hysteresis)			Standard	
Expansion valve	Winter protection: auto-on of the pump with low ambient temperature (software function)			Standard	
	Anti flood system (if automatic filling system included)			Standard	
	Electronic expansion valve (EEV)			Standard	
Compressor	Scroll			Standard	
	Crankcase heater			Standard	
	Noise reduction jacket			Standard	
System integration	Remote on/off			Standard	
	Single free contact for all alarms			Standard	
	Remote setpoint + temperature transmission (4.20mA)			Optional	
	Modbus RTU - RS480			Accessory	
	Profibus			Accessory	
	Profinet			Accessory	

## Features table TCA 55-215

Features		TCA 55-215	TCA 55-215AD	TCA 55-215AF	TCA 55-215AP
System integration	TCP			Accessory	
	Ethernet IP			Accessory	
	CANbus			Accessory	
	Remote control panel			Accessory	
Connectivity	Smartlink connectivity includes modem (3D) and service license			Standard	
	Smartlink UPTIME license			optional	
Freecooling	Aluminum fins copper tube cooling coil	n/a		Standard	
	Three way valve (free cooling control)	n/a		Standard	
Adiabatic system	Adiabatic pads, controlled by patented philosophy	n/a	Standard	n/a	Standard
	Descaling inline filters for adiabatic water system (delivered loose)	n/a	Optional	n/a	Optional
Hydronics	No pump			Standard	
	Pump 1P non-ferrous				
	Pump 3P non-ferrous				
	Pump 5P non-ferrous				
	Pump 1P non-ferrous + standby unit				
	Pump 3P non-ferrous + standby unit				
	Pump 5P non-ferrous + standby unit				
	No tank			Standard	
	Internal epoxy coated tank, externally painted and insulated, closed circuit			Standard	
	Hydro devices included: solenoid valve, water level sensor, city water line filter, safety relief valve (2,5 bar), venting valve, drain			Standard	
	Manual filling system				
	Automatic filling system (solenoid valve, tap water filter, MKVS controlled)				
	External manual by-pass				
	Water pressure gauge (only if pump is included)				
	Groover water connections				
	Flanges EN 1092-1 type 13B/PN16 galvanized carbon steel (ex UNI 2254-67)			Optional	
	Flanges ASME/PN16 Galvanized carbon steel			Optional	
	Counterflanges			Optional	
	Gas male threaded water connections = BSP (British Standard Pipe)			Optional	
	NPT (only for TCA 55-65)			Optional	
Water strainer (delivered loose, brass, 500 micron)			Optional		
Fan	AC variable speed fan (phase circuit controlled above -10°C)	Standard		n/a	
	EC variable speed fan (brushless fan with integrated control, suitable above -20°C ambient)	Optional		Standard	
Condenser	Condenser (Microchannel) - with epoxy powder coating			Standard	
	Cleanable condenser air filter (frame and mesh in aluminum)	Standard	Optional	Standard	Optional
Evaporator	Shell and tubes heat exchanger			Standard	
Refrigerant circuit	Sight glass			Standard	
	Liquid receiver			Standard	
	Filter dryer			Standard	
Packaging	Pallet and plastic wrap protection			Standard	
	Wooden crate			Optional	
	Sea-worthy wooden box			Optional	

# Technical specifications

TCA 55-215

## TCA A

Model	TCA 55A	TCA 65A	TCA 75A	TCA 105A	TCA 125A	TCA 155A	TCA 185A	TCA 215A
Cooling capacity (1) kW	55.6	63.2	75.7	97.7	119.0	152.0	187.0	207.0
Total absorbed power (1) kW	19.5	24.2	26.2	34.6	45.7	53.0	75.1	86.8
EER (1)	2.85	2.61	2.89	2.82	2.60	2.87	2.49	2.38
Cooling capacity (2) kW	75.1	95.7	107.9	135.7	171.5	222.0	267.0	298.0
Total absorbed power (2) kW	18.5	23.4	25.4	31.4	41.9	50.8	72.3	83.9
EER (2)	4.06	4.09	4.25	4.31	4.09	4.37	3.69	3.55

## TCA AF

Model	TCA 55AF	TCA 65AF	TCA 75AF	TCA 105AF	TCA 125AF	TCA 155AF	TCA 185AF	TCA 215AF
Cooling capacity (1) kW	54.0	60.9	72.2	94.1	117.9	149.9	180.5	204.8
Total absorbed power (1) kW	20.1	24.4	27.3	36.6	48.6	54.4	76.4	87.4
EER (1)	2.68	2.50	2.64	2.57	2.42	2.75	2.36	2.34
Cooling capacity (2) kW	74.0	93.6	106.6	132.2	168.9	217.6	262.6	293.4
Total absorbed power (2) kW	18.5	23.6	25.0	31.1	42.0	51.1	70.6	85.1
EER (2)	4.01	3.97	4.27	5.25	4.02	4.25	3.72	3.45
Total Free cooling at (4) (°C)	9.5	8.0	9.5	8.0	6.0	7.0	5.0	3.0
Total absorbed power (4) kW	6.6	6.6	9.9	9.9	9.9	9.9	9.9	9.9
EER (4)	11.2	14.2	10.8	13.4	17.1	22.0	26.5	29.6

## TCA AD

Model	TCA 55AD	TCA 65AD	TCA 75AD	TCA 105AD	TCA 125AD	TCA 155AD	TCA 185AD	TCA 215AD
Cooling capacity (1) kW	57.5	67.2	82.8	108.4	134.3	166.7	203.5	228.8
Total absorbed power (1) kW	17.4	22.7	23.5	31.6	39.6	45.7	64.4	73.6
EER (1)	3.30	2.96	3.53	3.43	3.39	3.65	3.16	3.11
Cooling capacity (2) kW	78.6	97.5	118.1	147.8	186.7	232.0	275.3	332.9
Total absorbed power (2) kW	16.2	22.2	22.4	28.9	38.5	42.9	63.9	77.2
EER (2)	4.84	4.40	5.28	5.12	4.85	5.41	4.31	4.19

## TCA AP

Model	TCA 55AP	TCA 65AP	TCA 75AP	TCA 105AP	TCA 125AP	TCA 155AP	TCA 185AP	TCA 215AP
Cooling capacity (1) kW	56.98	66.22	78.77	101.97	125.05	162.12	200.49	226.15
Total absorbed power (1) kW	17.88	23.13	23.60	30.85	38.90	47.42	66.15	76.31
EER (1)	3.19	2.86	3.34	3.30	3.22	3.42	3.03	2.96
Cooling capacity (2) kW	77.9	97.7	111.3	139.9	177.2	227.3	275.0	319.2
Total absorbed power (2) kW	16.6	22.5	22.4	28.4	38.0	44.4	65.4	79.9
EER (2)	4.70	4.34	4.97	4.93	4.66	5.12	4.21	4.00



