ABB is a leading supplier of synchronous turbine-driven generators to power utilities, paper mills, sugar plants, oil and gas installations, and many other sectors. We have been manufacturing generators for more than 120 years and have extensive application experience with tens of thousands of installations all over the world. ABB offers reliable and efficient power generation with worldwide support.

One of the factors that determine the lifetime of a generator is temperature. As all losses generate heat it is important to have a cooling system that can maintain a sufficiently low operating temperature within all parts of the generator. In order to achieve this, pre-engineered generators use a symmetrical cooling principle that allows uniform cooling within the generator.

Available cooling systems
The pre-engineered generator line can be provided with three different cooling methods depending on the ambient conditions.

- **Open ventilated** where the ambient air is used directly for cooling.
- **Air-to-water cooler** where the internal air in the generator is cooled by a top mounted water cooler.
- **Air-to-air cooler** where the internal air is cooled by the ambient air through a top mounted tube heat exchanger.

Open ventilated (IC3A1)
Pre-engineered generators are equipped as standard with an open ventilated (IC3A1) cooling system with ducts on the air inlets and outlet. The ducts are fitted with flanges for the connection of external air channels. The inlet air channels must be equipped with filters (minimum filter class F6). This cooling method is more dependent on ambient conditions than the others, as dirt can be sucked into the generator and cause contamination.

The open ventilated cooling method also requires greater attention to the design of the external air channels, for example:

- Cold environment - avoiding stand-still draft into the generator.
- Pressure drop - maximum allowed pressure drop is 400Pa for the external ducts
- Noise level - without external ducts the noise is typically 15dB higher than for an enclosed water cooled generator.
- Mix of cold and warm air - as a minimum requires external intake duct.
The following materials are used in air-to-water coolers:

- Inner tube material: copper-nickel (90/10)
- Outer tube material for double tube cooler: copper
- Plate fin material: aluminum
- Cooler top housing material: Painted carbon steel
- Tube sheet material: naval brass (CuZn38Sn1)
- Header material: rilsan coated steel (polyamide 11)
- Cooler element casing material: galvanized steel

The air-to-water cooler is available with a water design pressure of 0.6 or 1.0 MPa and a water test pressure of 0.9 or 1.5 MPa. The cooler can be provided with single or double tubes and flanges according to DIN (DN100) or ANSI (4”). Redundancy is only available for coolers with the higher design and test pressure (1.0/1.5 MPa).

The following materials are used as standard in the air-to-air cooler:

- Tube material: galvanized steel or aluminum
- Tube plate material: mild steel
- Intermediate plate material: mild steel

The following materials are available as an option:

- Tube material: AISI 304L
- Tube sheet material: AISI 304L
- Intermediate plate material: AISI 304L
- Pressure switches in cooler inlet air circuit

The following fan configurations are available as options:

- Three external fans for a redundancy of 3 x 50%
- Certified for hazardous area

Please note that the delivery time of the complete generator may be affected by the choice of options.