Schmidt + Clemens Group

Centralloy® G 4879 Micro

MATERIAL DATA SHEET

Designation: G-NiCrTi28W

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Contents:

Features

Centralloy® G 4879 Micro is a cast austenitic alloy containing nickel, chromium, tungsten and titanium. The alloy has good high temperature stress rupture strength and good carburisation and oxidation resistance. The presence of carbon leads to the formation of a series of carbides:

a) Intergranularly occurring primary carbides, nitrides or carbonitrides of the general form $M_6(C,N)$, where M is tungsten. These greatly affect the generation of good high temperature properties. The phase is visible in unetched micro specimen, its colour varying from the orange/yellow of the nitride to the grey/mauve of the carbide.

b) Chromium-rich intergranular carbides of the M_7C_3 and $M_{23}C_6$ types. These carbides have a profound influence on properties due to decomposition and re-precipitation reactions in service producing secondary carbides in a rather uniform dispersion. By this mechanism dislocation movement is impeded with the result of significant strengthening at elevated temperatures.

Product Forms

Centralloy® G 4879 Micro was designed as centrispun tube material to match specific design criteria in terms of carburisation and oxidation resistance, creep rupture strength and weldability. Other forms e.g. statically cast and investment cast products may be supplied upon request. Additional information regarding these topics and maximum and minimum sizes may be obtained from the sales department.

Chemical Composition(*)

	mass percentage
Carbon	0.50
Silicon	1.00
Manganese	0.75
Chromium	28.00
Iron	15.00
Tungsten	5.00
Titanium	Additions
Nickel	Balance

(*) This is a typical composition which may be slightly modified according to the application.

Applications

Tubular components requiring carburisation and oxidation resistance combined with high creep rupture strength and creep resistance. No heat treatment is required for most applications of this grade. Main high temperature application for the material is:

Process:	max. operating temperature, °C
Direct reduction of iron ore	1175

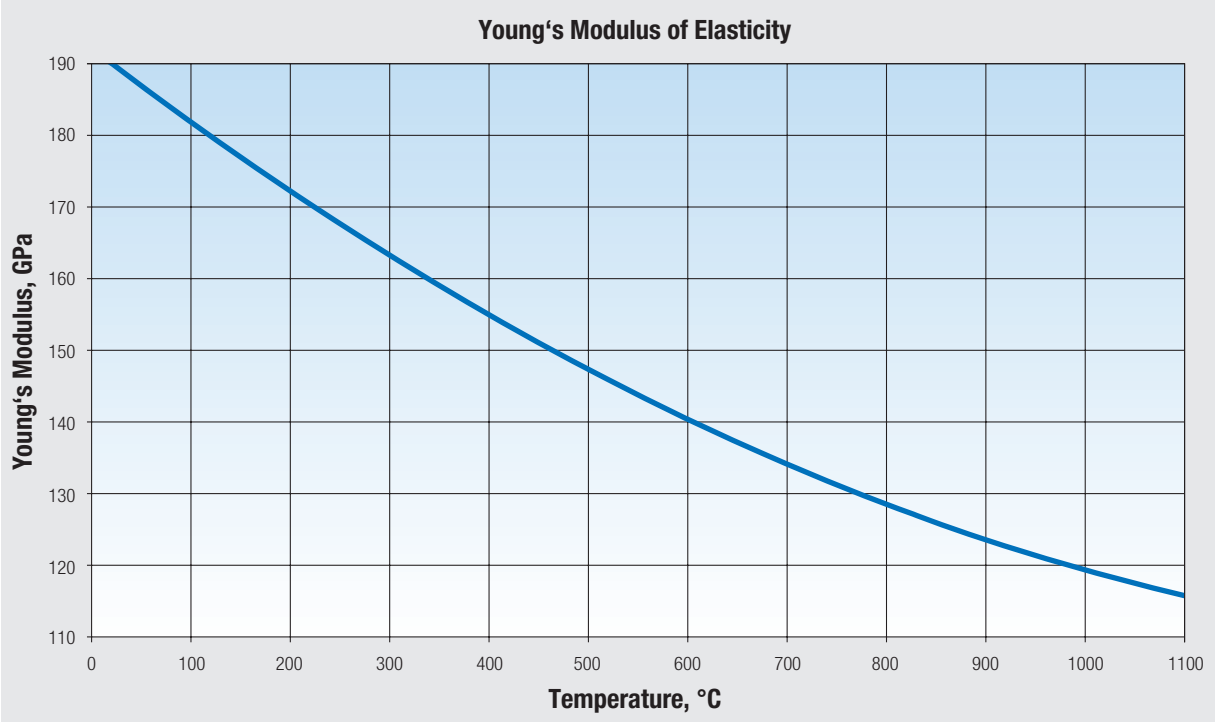
Physical Properties

Density at 20°C: 8.2 g/cm³

Typical physical properties

δ, °C	α, 10^{-6}/K	λ, W/m K	c_p, J/kg K	a, $10^{-6}m^2/s$
20	–	13.8	445.9	2.8
100	14.0	15.1	464.1	3.1
200	14.5	16.8	483.9	3.4
300	15.0	18.4	501.0	3.7
400	15.5	20.0	515.8	4.0
500	15.9	21.6	528.9	4.3
600	16.3	23.2	540.6	4.6
700	16.7	24.9	551.5	4.8
800	17.0	26.5	561.9	5.0
900	17.3	28.1	572.3	5.2
1000	17.5	29.7	583.3	5.4
1100	17.7	31.2	595.2	5.5

δ: Temperature
α: Mean coefficient of linear thermal expansion
λ: Thermal conductivity
c_p: Mean specific heat
a: Thermal diffusivity

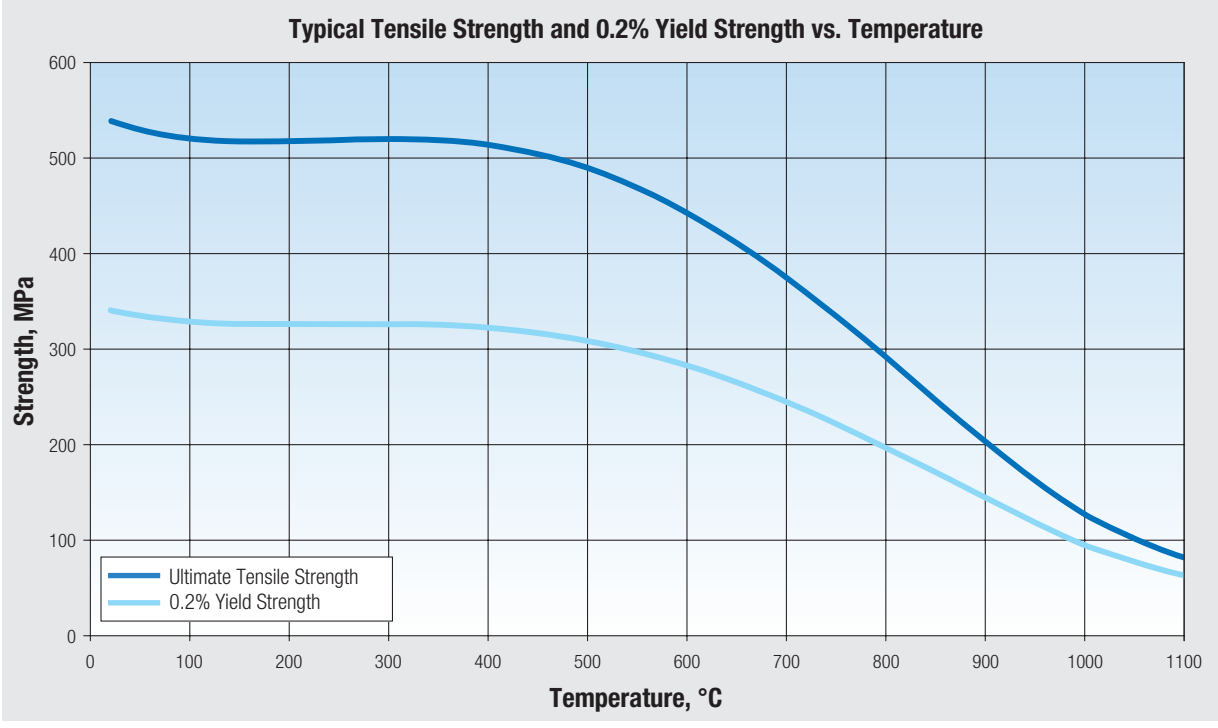


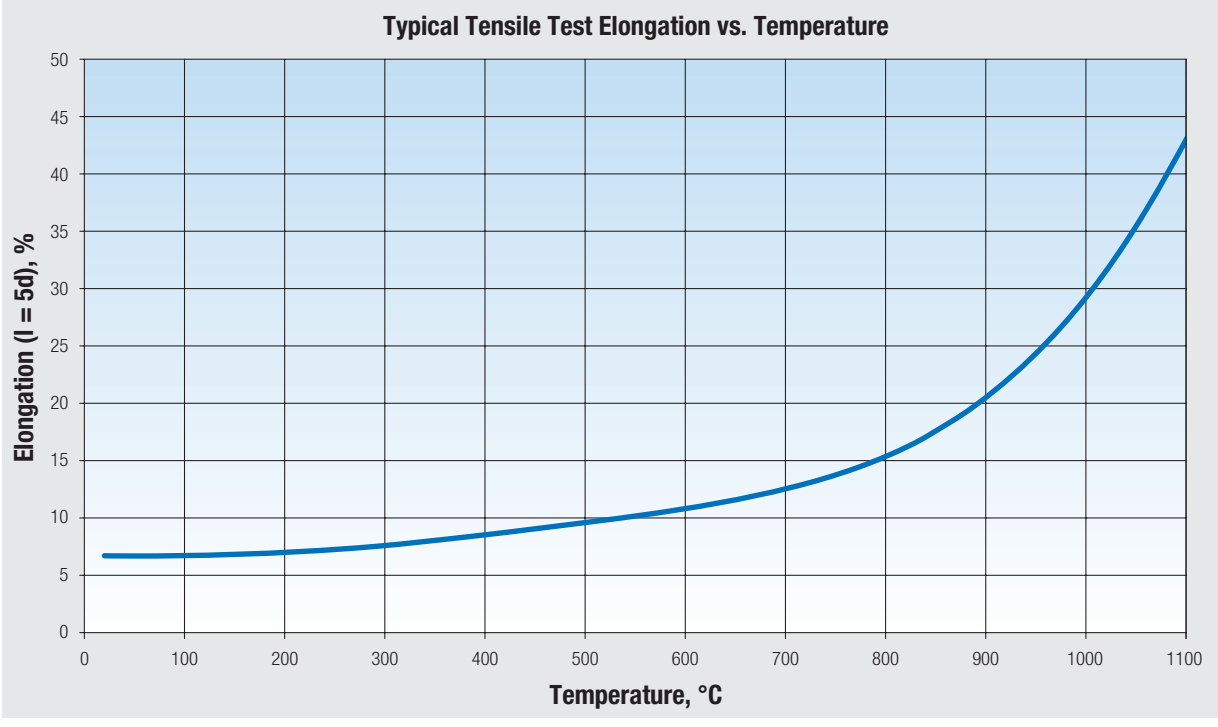
Mechanical Properties

(only for wall thickness less than 25 mm, in the as cast conditions)

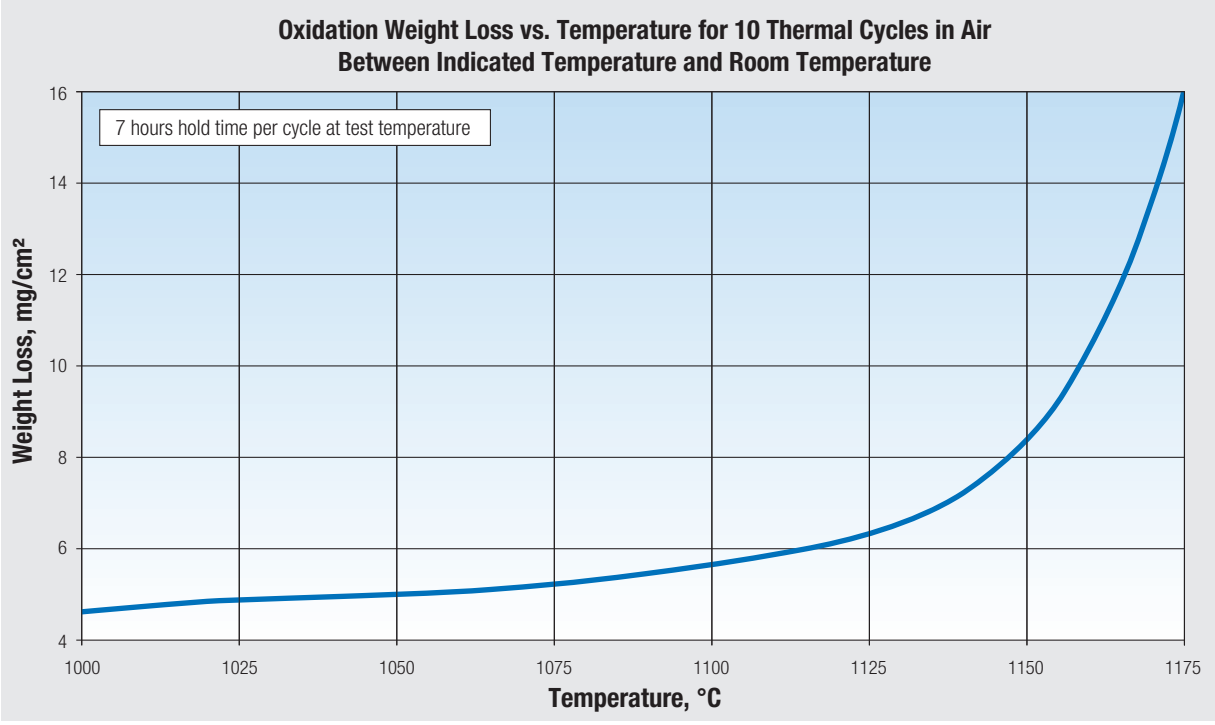
Tensile properties

Minimum tensile properties at 20°C:	0.2% Yield strength:	290 MPa
	Ultimate tensile strength:	490 MPa
	Elongation, (l = 5d):	4.0% for centricast tubes
		3.0% for static castings

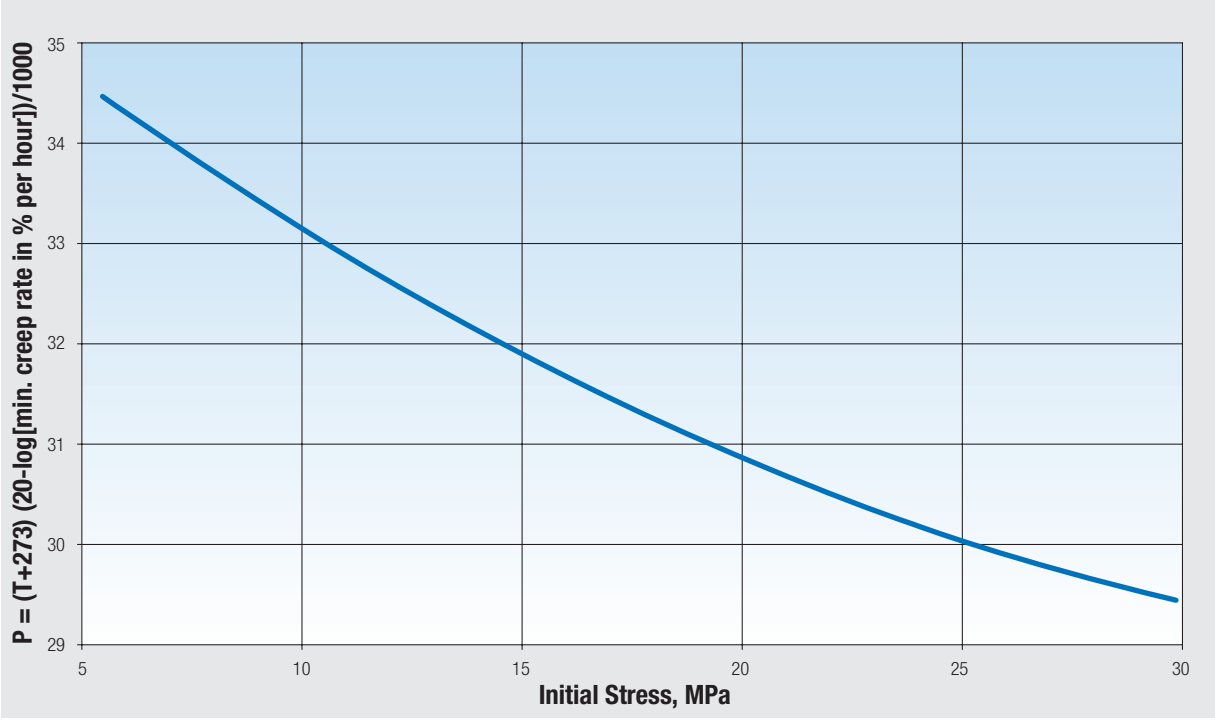




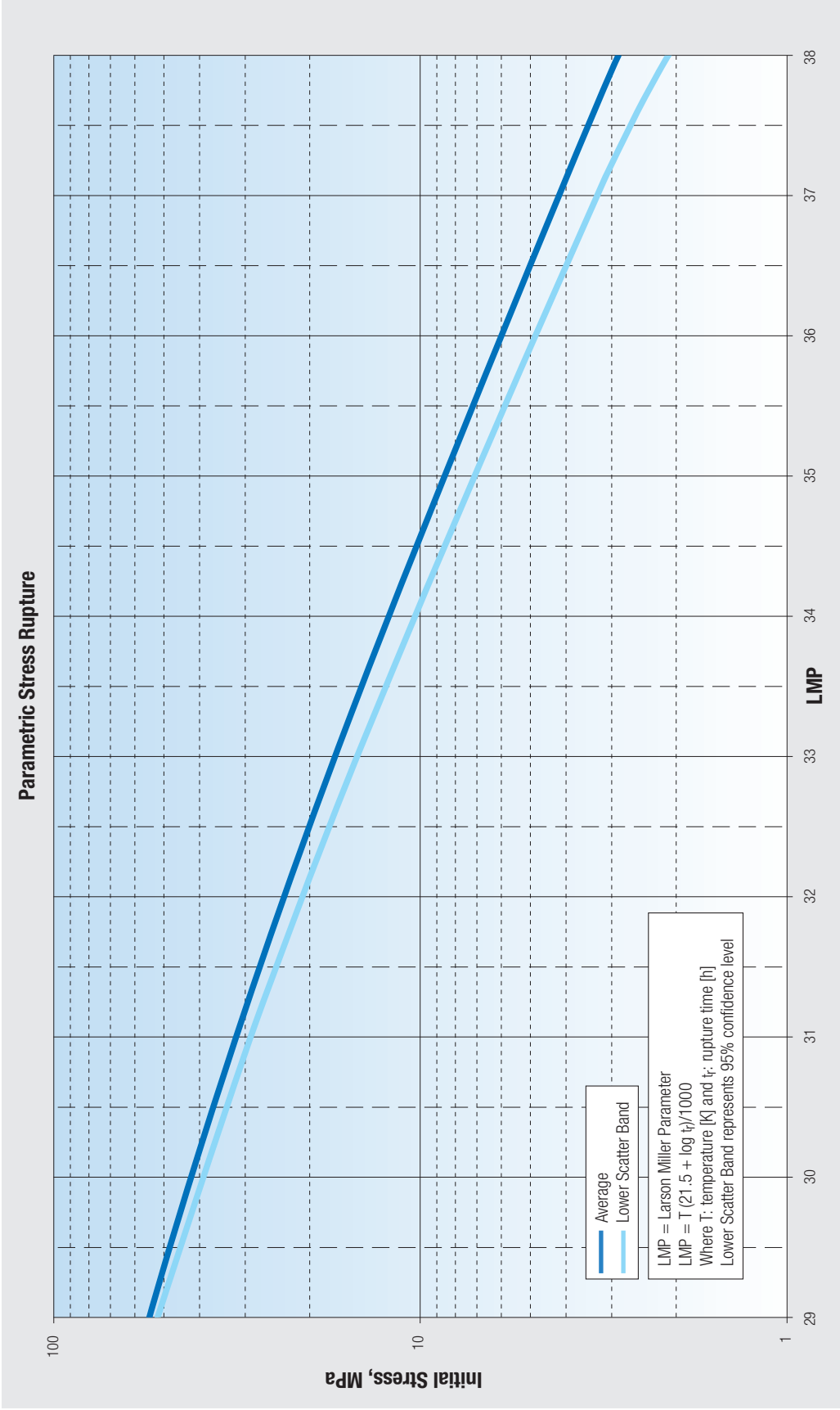
Oxidation Resistance



Parametric Minimum Creep Rate



Parametric Stress Rupture Strength



Manufacturing Characteristics

Machining

In general terms the machinability of Centralloy® G 4879 Micro is similar to that of other heat resistant alloys.

Welding

Matching filler materials are commercially available. These welding consumables have high strength properties at elevated temperatures with good retained ductility. Besides fillerless PAW, GTAW and MAW have been satisfactorily used. Preheating and postweld heat treatment of the joint is not necessary. For dissimilar weld joints to austenitic materials suitable filler materials are recommended. Further information will be supplied upon request.

Health and Safety Information

The operation and maintenance of welding equipment should conform to the provisions of relevant national standards for the protection of personnel.

Mechanical ventilation is advisable and under certain conditions in confined spaces, it is necessary during welding operations to prevent possible exposure to hazardous fumes, gases or dust that may occur.

Nickel- and iron-base materials may contain, in varying concentrations, the elements chromium, iron, manganese, molybdenum, cobalt, nickel, tungsten and aluminium. Inhalation of metal dust from welding, grinding, melting and dross handling of these alloy systems may cause adverse health effects.

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Spun Casting – Petrochemical Industry

Industries
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- Iron-ore direct reduction

Services
- Business consulting
- Analysis of operational data
- Training of customer personnel
- Welding supervision

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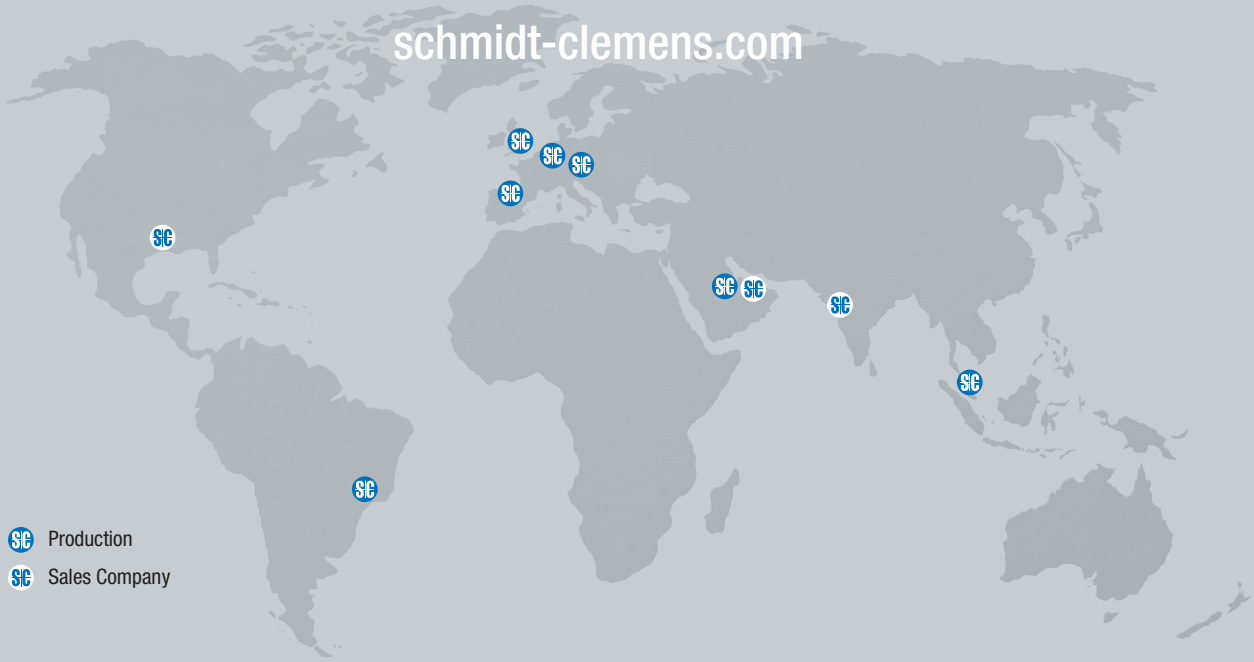

Production
Sales Company

11/11 – Brinkmann GmbH, Die Agentur für Kommunikation, Krefeld