

The chemical and petrochemical industry in particular has distinguished itself as an industrial pacemaker with a constant series of new developments.

Care of the environment and responsible husbanding of the world's resources are today factors of increasing importance. Processes which present a risk for man and the environment must be effectively shielded; potentially dangerous by-products must be avoided where possible, and in any event rendered harmless and suitable for careful disposal or neutralised and re-used in new processes and applications. This is effective recycling.

Today's simultaneous demand for the highest possible efficiency coupled with improved service life points up the need for outstanding solutions which can reconcile such contradictory requirements and point the way to even better performance in the future. Only high-efficiency products with a guaranteed long life and ease of maintenance are really capable of meeting modern ecological and economic objectives.

We support you in the selection of such materials with high corrosion-resistant and high-temperature HÖVER Coralloy special alloys and HÖVER Coralloy stainless steels.

Höverstahl – Chemical and Petrochemical Plants

Corrosion-resistant stainless steels – high-performance stainless steels



Material	No.	Alloy type	Application
Chrome and chrome molybdenum steels with 13-19% chromium			
With lapped or polished surface satisfactory resistance to water, steam, dilute strong alkalis and weak oxidizing acids.			
Coracid 410 Coracid 420 Coracid 410-15 Coracid 4120	1.4006 1.4021 1.4024 1.4120	X 12 Cr 13 X 20 Cr 13 X 15 Cr 13 X 20 CrMo 13	Apparatus and vessel construction in the chemical industry as well as the food, drink and tobacco industry, shipbuilding, valves, extruder screws, power station and reactor construction.
With good resistance to water, steam, weak acids and alkalis as well as to stronger oxidizing acids. Material 1.4057 shows good resistance to sea water attack.			
Coracid 431 Coracid 13-4 Coracid 13-4 mod. Coracid 16-5	1.4057 1.4313 1.4320 1.4418	X 17 CrNi 16.2 X 4 CrNi 13.4 X 2 CrNiMo 13.4 X 4 CrNiMo 16.5.1	The steel X 2 CrNi 13-4 (material no. 1.4320) is alloyed for use in sour gas in accordance with NACE-MR 0175. We also offer you on request F 6 NM Type (UNS S 41500).
Austenitic nickel-chromium and nickel-chromium molybdenum steels			
High corrosion resistance and very good mechanical qualities.			
Coracid 304 Coracid 303 Coracid 304L Coracid 4311 Coracid 310L Coracid 316 Coracid 316L Coracid 316LN Coracid 316LN	1.4301 1.4305 1.4306 1.4311 1.4335 1.4401 1.4404 1.4406 1.4429	X 5 CrNi 18.10 X 8 CrNiS 18.9 X 2 CrNi 19.11 X 2 CrNi 18.10 X 1 CrNi 25.21 X 5 CrNiMo 17.12.2 X 2 CrNiMo 17.12.2 X 2 CrNiMoN 17.11.2 X 2 CrNiMoN 17.13.3	Apparatus and vessel construction in the thermal industry as well as the food, drink and tobacco industry, fat and soap industry, textile, cellulose and dyeing industry, nuclear industry, marine engineering, emission control, machined components on automatic lathes (1.4305).
Increased resistance against non-oxidizing acids and halogen containing media is provided by the addition of molybdenum. Material 1.4539 with added copper shows increased resistance to sulphuric acid.			
Coracid 316L Coracid 316 Coracid 317L Coracid 317L Coracid 317LN Coracid 317 Coracid 4465 UREA Coracid 4503 Coracid 904L Coracid 630	1.4435 1.4436 — 1.4438 1.4439 1.4449 1.4465 1.4503 1.4539 1.4542	X 2 CrNiMo 18.14.3 X 3 CrNiMo 17.13.3 ~X 2 CrNiMo 18.16.4 X 2 CrNiMo 18.15.4 X 2 CrNiMoN 17.13.5 X 5 CrNiMo 17.13 X 2 CrNiMoN 25.25 X 3 NiCrCuMoTi 27.23 X 1 NiCrMoCu 25.20.5 X 5 CrNiCuNb 16.4	Nitrogen-alloyed austenitic materials with high N contents are employed for the following applications: - Environmental technology (FGD plants) - Urea industry - Marine engineering - Water resources management (high chlorine ion contents) Such alloys are also used with high degrees of purity in high vacuum engineering.
The grades with the stabilising elements titanium and niobium cannot be highly polished.			
Coracid 321 Coracid 347 Coracid 316Ti Coracid 4575 Coracid 4580 Coracid 4583	1.4541 1.4550 1.4571 1.4575 1.4580 1.4583	X 6 CrNiTi 18.10 X 6 CrNiNb 18.10 X 6 CrNiMoTi 17.12.2 X 1 CrNiMoNb 28.4.2 X 6 CrNiMoNb 17.12.2 X 10 CrNiMoNb 18.12	
Superaustenitic, high nickel and molybdenum alloy special steels with extraordinary corrosion resistance. Controlled addition of nitrogen for higher mechanical strength combined with good toughness. Chromium, molybdenum and nitrogen increase in particular the resistance against pitting corrosion. The critical pitting temperature is thus much more favourable with super-austenitic steels.			
Coracid 926 Coracid 254 SMO Coracid 31 Coracid 28 Coracid 4565 Coracid 24 Coracid 33	1.4529 1.4547 1.4562 1.4563 1.4565 1.4566 1.4591	X 1 NiCrMoCuN 25.20.7 X 1 CrNiMoCuN 20.18.7 X 1 NiCrMoCu 32.28.7 X 1 NiCrMoCu 31.27.4 X 3 CrNiMnMoNbN 23.17.5.3 X 3 CrNiMnMoCuNbN 23.17.5.3 X 1 CrNiMoCuN 33.32.1	For plants which get in contact with seawater and brackish water. Particularly to be noted is the very good resistance against gap and wear corrosion as well as stress corrosion cracking induced by pitting corrosion.
Duplex materials			
Ferritic-austenitic high performance nickel-chromium molybdenum steels			
With high resistance to wear and good running qualities, low sensitiveness to stress corrosion cracking and impervious to intergranular corrosion.			
Coracid-D-27.06 Coracid-D-22.05 Coracid-D-24.5.3.A1 Coracid-D-24.5.3.A2	1.4460 1.4462 ~1.4462-A1 ~1.4462-A2	X 3 CrNiMoN 27.5.2 X 2 CrNiMoN 22.5.3 X 2 CrNiMoN 24.5.3 X 2 CrNiMoN 24.5.3	Cellulose and dyeing industries, petrochemical industry, shafts in acid pumps, machine components in contact with seawater.
Super duplex materials			
Stainless ferritic-austenitic nickel-chromium molybdenum steel with added copper. Good resistance against stress corrosion cracking and pitting corrosion. High resistance in sulphuric acid media. Required surface finish: Pickled or machined.			
Coracid Super D-255 (UNS 32550)		X 3 CrNiMoCuN 26.6.3.2	Components in the chemical industry, in flue gas desulphurising plants, the mineral oil and natural gas industry, in dyeing, in pumps which come in contact with sea water.
Highest corrosion resistance and good mechanical properties. Good welding properties. Excellent resistance to stress corrosion cracking (SCC), vibration cracking, pitting, gap and erosion corrosion.			

Corrosion-resistant stainless steels – high-performance stainless steels



Material	No.	Alloy type	Application
Coracid Super D-25.07 (UNS 32750)	1.4410	X 2 CrNiMoN 25.7.4	Components in contact with seawater, e.g. heat exchangers, feed pumps, injection pumps, chemical industry, waste water technology, mineral oil and natural gas recovery, separators, LCP components, fans.
Coracid Super D-100 (UNS 32760)	1.4501	X 2 CrNiMoCuWN 25.7.4	

Copper-nickel materials

Copper-nickel alloy with approx. 10% nickel as well as iron and manganese additions. Good resistance to seawater, brackish and industrial water. Good resistance in clean, moving sea water (flow velocities of 1 - 3.5 m/s). Good resistance against stress corrosion cracking.

Coralloy CuNi 90-10	2.0872	CuNi 10 Fe 1 Mn	Sea-water pipeline systems on ships, oil and gas platforms. Flow pipes to sea water desalination plants, offshore power stations and refineries. Condensers and heat exchangers in power stations. Refineries and sea water desalination plants.
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Copper-nickel materials

Copper-nickel alloy with approx. 30% nickel as well as iron and manganese additions. Very good resistance to seawater, brackish and industrial water. Very good resistance in moving, contaminated seawater (flow velocities of 1 - 4.5 m/s). Good resistance against erosion, cavitation and stress corrosion cracking.

Coralloy CuNi 70-30	2.0882	CuNi 30 Mn 1 Fe	
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Nickel and cobalt materials



Material	No.	Alloy type	Standard designation	Application
Coralloy B-2 High corrosion resistant nickel-based alloy molybdenum and reduced C-content	2.4617	NiMo 28	Hastelloy B-2	Chemical apparatus, outstandingly resistant to hydrochloric acid and a wide range of sulphuric acid concentrations.
Coralloy B-3 Coralloy B-4 Further development of B-2, better weldability	2.4600	NiMo29Cr	Hastelloy B-3 KRUPP-VDM Alloy B-4	
Coralloy C-4 High corrosion resistant nickel-based alloy with molybdenum, chromium and reduced C-content	2.4610	NiMo 16 Cr 16 Ti	Hastelloy C-4	Chem. apparatus (high resistance requirement)
Coralloy 20 Nickel-based alloy with very good mechanical properties at high temperatures	2.4660	NiCr 20 CuMo	Carpenter 20 Cb 3	Chem. apparatus, heat exchangers in the chemical industry.
Coralloy 22 NiCrMo alloy with W, extremely low C and Si contents, high corrosion resistance	2.4602	NiCr 21 Mo 14W	Hastelloy C-22	Environmental technology, chlorine plants, paper and cellulose works, acetic acid production, sour gas burden
Coralloy 59 NiCrMo alloy, especially low C and Si contents, high corrosion resistance, high mechanical strength	2.4605	NiCr 23 Mo 16 Al	Alloy 59	Environmental technology, organic chemistry, pharmaceutical intermediate products, paper and cellulose works, acetic acid production
Coralloy 200 Pure nickel with at least 99.2% Ni	2.4066	Ni 99.2	Nickel 99.2	Apparatus for the production and processing of mineral products, paints, enamels, epoxies, detergents, acetic acid etc., pickling plants, petrochemistry, offshore rigs.
Coralloy 201 Pure nickel with at least 99.2% Ni and a C content of max. 0.02%	2.4068	LC-Ni 99	LC-Ni 99.2	Apparatus specifically for the production and processing of caustic soda.
Coralloy C-276 High corrosion-resistance nickel-based alloy with molybdenum and chromium	2.4819	NiMo 16 Cr 15 W	Hastelloy C-276	Chemical apparatus (high order of resistance)
Coralloy 333 High temperature-resistant Ni-Cr-Fe alloy	2.4608	NiCr 26 MoW	Alloy 333	Gas turbines (combustion chamber), petrochemistry, furnaces
Coralloy 400 Nickel-Copper alloy	2.4360	NiCu 30 Fe	Monel 400	Offshore rigs, nuclear industry, chemical industry, mineral oil industry
Coralloy K-500 Precipitation hardenable Nickel-Copper alloy with aluminum addition	2.4375	NiCu 30 Al	Monel K-500	Offshore rigs, deep hole drilling, pump shafts, springs, valves, electrical components
Coralloy 600 High corrosion-resistance nickel-based alloy	2.4640 2.4816	NiCr 15 Fe	Inconel 600	Chem. apparatus, industrial furnaces, nuclear industry

Nickel and cobalt materials



Material	No.	Alloy type	Standard designation	Application
Coralloy 601 Mixed crystal alloy with excellent high temperature qualities	2.4851	NiCr 23 Fe	Inconel 601	Industrial furnaces, petrochemistry, off-gas detoxifying
Coralloy 625 Nickel molybdenum niobium chrome alloy with high strength and toughness from ultra-low temperatures to 1100°C	2.4856	NiCr 22 Mo 9 Nb	Inconel 625	Aerospace, chem. process engineering, offshore rigs, nuclear industry, production of superphosphoric acid
Coralloy 686 NiCrMo alloy with tungsten, highly corrosion-resistant, easily weldable, good mechanical strength values	2.4606	NiCr 21 Mo 16 W	Inconel 686	Chemical industry, paper and cellulose works, flue gas desulphurisation
Coralloy 800/H/HT Corrosion- and heat-resistant nichrome-alloyed special steel	1.4876 1.4958 1.4959	X 10 NiCrAlTi 32.20 X 5 NiCrAlTi 31.20 X 8 NiCrAlTi 32.21	Incoloy 800 Incoloy 800 H Incoloy 800 HT	Industrial furnaces and steam boiler construction, chemical and petrochemical industry, nuclear industry
Coralloy 825 Nickel alloy with chrome, copper and molybdenum	2.4858	NiCr 21 Mo	Incoloy 825	Chem. apparatus, pumps, heat exchangers, nuclear industry

Titanium and titanium alloys



Material	No.	Application
Pure titanium		
Coralloy CP Ti-1 Aeralloy CP Ti-1 Pure titanium Gr.1	3.7025 3.7024	Pure titanium shows an outstanding corrosion resistance in oxidizing media. The mechanical properties are basically achieved through specified oxygen contents. Used for structural parts in aircraft, the chemical industry and heat exchangers. Pure titanium variant with good ductility and cold mouldability, adequate mechanical strength. Outstanding weldability. High corrosion resistance in strongly oxidizing (e.g. HNO ₃) to weakly reducing environments, including chlorides. Seawater-cooled condensers and coolers in power stations. Vapour heaters and condensers in sea water desalination plants. Oil and gas coolers on offshore drilling platforms. Heat exchangers, columns and strippers in the processing of chlorine gas, acetic acid, soda, urea, hypochlorite, chlorine dioxide and other oxidizing media.
Coralloy CP Ti-2 Aeralloy CP Ti-2 Pure titanium Gr.2	3.7035 3.7034	Most usual pure titanium variant. Good availability. Good balance between mechanical strength and ductility.
Coralloy CP Ti-3 Pure titanium Gr. 3	3.7055	Pure titanium variant with improved strength.
Coralloy CP Ti-4 Aeralloy CP Ti-4 Pure titanium Gr.4	3.7065 3.7064	High mechanical strength and good weldability distinguish pure titanium Gr.4, accompanied by adequate corrosion resistance in neutral to oxidizing environments, including chlorides. An improvement in corrosion resistance in reducing media is achieved by the addition of about 0.2 wt.-% palladium (Pd) for the pure titanium variants Coralloy CP Ti-1/Ti-2/Ti-3. The mechanical properties are not influenced by this.
Coralloy CP Ti-1-Pd Pure titanium Pd-alloyed Gr. 11	3.7225	Pd-alloyed pure titanium variant of Gr. 1
Coralloy CP Ti-2-Pd Pure titanium Pd-alloyed Gr. 7	3.7235	Pd-alloyed pure titanium variant of Gr. 2
Coralloy CP Ti-3-Pd	3.7255	Pd-alloyed pure titanium variant of Gr. 3
Zirkon		
Coralloy Zirconium 702 Coralloy Zirconium 704	– –	Highly resistant alloys for applications in highly corrosive organic media (e.g. acetic acid), also against dilute oxidizing and reducing media. These two alloys are also used outside nuclear areas of application, where Coralloy Zirconium 704 exhibits slightly improved mechanical properties. Used in plants for the production of hydrochloric acid, acetic acid and urea.

We can offer you further materials and variants on request.

*) Standard trade designations of: General Electric, Cabot, Haynes, Special Metals, Teledyne, Inco Group, VDM Nickel Technology, Republic Steel, IMI, United Technologies, Carpenter