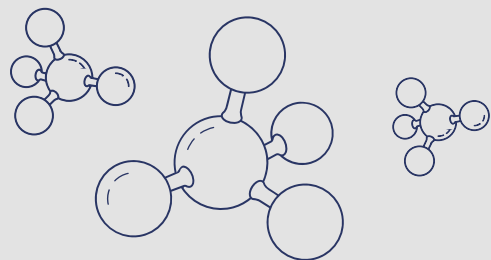


# LOW CARBON SOLUTIONS BY TUBACEX

Tubacex’s ambitious 2030 program aligns strategically with global decarbonization efforts by incorporating advanced material solutions for CCUS (Carbon Capture, Utilization, and Storage) and hydrogen, helping carbon-intensive industries reduce emissions. This initiative marks a significant shift towards sustainability, adapting Tubacex’s investments and expertise to better support industries in reducing their carbon footprint.

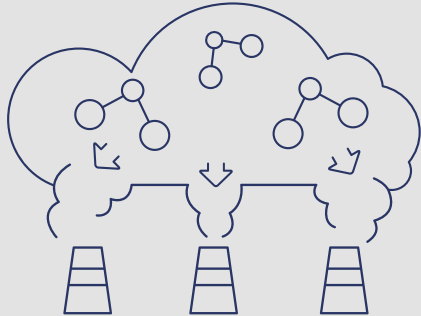
## About hydrogen

Hydrogen plays a crucial role in our strategy as a viable low-emission fuel source that meets increasing energy demands with zero emissions at the point of use. Its versatility makes hydrogen essential in various industrial applications, significantly impacting sectors like the steel, cement, and other hard-to-abate industries where CO<sub>2</sub> is integral to their processes.



## CCUS Technologies

Tubacex focuses on CCUS technologies for capturing, utilizing, and securely storing CO<sub>2</sub> emissions, preventing them from entering the atmosphere. This targeted approach prioritizes reducing atmospheric CO<sub>2</sub> levels, which is crucial for achieving net-zero targets.



Integrating low-carbon segments into Tubacex’s portfolio enhances our comprehensive solutions and reinforces our “all-of-the-above” strategy. Through **continuous innovation in materials and processes**, we aim to reduce greenhouse gas emissions for both our operations and customers, promoting a sustainable industrial landscape. Our commitment to Low Carbon Solutions, along with our expertise and scale, positions us as a leader in the energy transition. By boosting hydrogen supply and expanding CCUS applications, **we support our customers in achieving emission reduction goals** playing a pivotal role in global decarbonization efforts.

PROMOTING CIRCULAR ECONOMY  
AND DECARBONIZATION



INNOVATION AS THE  
CORE TOWARDS A  
SUSTAINABLE AND  
ADVANCED FUTURE

We lead with innovation towards a sustainable and advanced future. Committed to research and development, we excel in seamless stainless steel tubes and high-quality alloys.

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**TUBACEX**  
GROUP

LOW CARBON SOLUTIONS

CRA SOLUTIONS FOR CO<sub>2</sub>  
SEQUESTRATION WELLS





# EMPOWERING DECARBONIZATION IN HARD-TO-ABATE SECTORS



## Reducing emissions in sector hard to decarbonize

Both the United Nations Intergovernmental Panel on Climate Change and the International Energy Agency recognize CCUS as a highly effective method for reducing emissions in sectors that are traditionally hard to decarbonize, such as chemicals and refining, cement production, and iron and steel manufacturing.



## Ability to capture over 90% of the emissions

Additionally, CCUS stands out as one of the select technologies capable of achieving negative carbon dioxide emissions, particularly when used in conjunction with bioenergy or direct air capture. The Center for Climate and Energy Solutions notes that CCUS can capture over 90% of the emissions from power plants and industrial facilities.



## The best tubular solutions for demanding environments

With our extensive history in proprietary alloy design, we understand subsurface challenges and specialize in advanced materials. This expertise enables us to deliver comprehensive tubular solutions tailored for safe and efficient CCUS operations, even in demanding environments.

# WE COVER ALL THE STAGES

1

## CAPTURE TECHNOLOGIES

Tubular requirements for pre and post combustión, DAC and Oxy-Fuel Capture Technologies.

- SS & Ni Alloy Tubes & Flittings (Heaters and HEX)
- Low Pressure Tubbing
- H&I Tubing

2

## COMPRESION AND TRANSPORTATION

Tubular requirements for compression to a supercritical condition and transportation via pipeline or vessels.

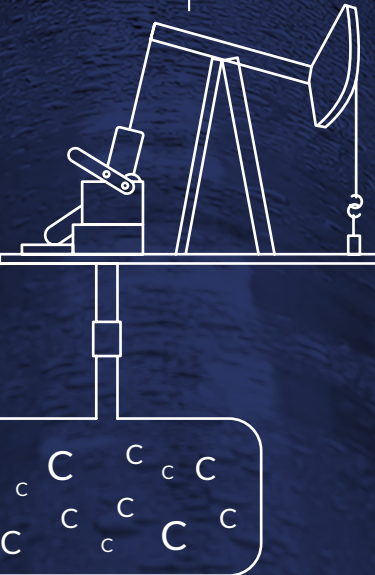
- SS & Ni Alloy Tubes & Flittings (HEX and Condensers)
- Flowlines
- H&I Tubing

3

## UTILIZATION AND STORAGE

CO<sub>2</sub> is safely and permanently stored underground.

- CRA OCTG Material for injection Lines
- T&C Connections
- Umbilical Tubing
- SS SD For Subsea Tubing



Tubacex's manufacturing range covers the main stainless steel grades, duplex superduplex and high nickel alloys requested by the CCUS industry. From our steel plant Aceralava (spain) we offer a tailor made list of steels. Our metalurgical engineers are devoted to the developement of sophisticated steels capable of operating in the demanding environments of the future

	ASTM	WNr	AFNOR	C max*	Cr	Ni	Mo	Other
Austenitic	304	14.301	TU Z 6 CN 18-09	0,08	17/20	8/11		
	304 L	14.306	TU Z 2 CN 18-10	0,03	18/20	10/12		
	304 H		TU Z 6 CN 19-10		18/20	8/11		
	321	14.541	TU Z 6 CNT 18-10	0,08	17/19	9/12		5 C ≈ Ti ≈ 0,60
	321 H		TU Z 6 CNT 18-12 B	0,04/0,10	17/20	9/13		4 C ≈ Ti ≈ 0,60
	347	14.550	TU Z 6 CNNb 18-10	0,08	17/19	9/12		10 C ≈ Nb ≈ 1,0
	347 H		TU Z 6 CNNb 18-12 B	0,04/0,08	17/20	9/13		8 C ≈ Nb ≈ 1,0
	316	14.401	TU Z 6 CND 17-11	0,08	16/18	11/14	2/3	
	316 L	14.404	TU Z 2 CND 17-12	0,03	16/18	11/14	2/3	
	316 Ti	14.571	TU Z 6 CNDT 17-12	0,08	16,5/18,5	10,5/13,5	2/2,5	5 C ≈ Ti ≈ 0,80
	(316 L)	14.435	TU Z 2 CND 17-13	0,03	17/18,5	12,5/15	2,5/3	
	(316)	14.436	TU Z 6 CND 17-12	0,07	16,5/18,5	11/14	2,5/3	
	316 Nb	14.580		0,08	16/18	11/13	2/5	10 C < Nb < 1,0
	316 N/316 LN			0,03	16/18	11/14	2/3	N 0,10/0,16
	316 L urea			0,03	17/18	13/15	2/3	
	317		TU Z 2 CND 19-15	0,08	18/20	11/15	3/4	
	317 L	14.438	TU Z 2 CND 19-15	0,03	18/20	11/15	3/4	
	309 S/309 H	14.833	TU Z 12 CN 24-12	0,08	22/24	12/15	0,75	
	310 S/310 H	14.845	TU Z 12 CN 25-20	0,08	24/26	19/22	0,75	
	310 MoLN	14.466		0,02	24/26	21/23	2/2,5	N=0,1/0,15 Si<0,4 P<0,02
Ferritic austenitic		1.4828	TU Z 17 CNS 20-12	0,20	19/21	11/13		Si 1,5/2,5
	314	14.841	TU Z 15 CNS 25-20	0,15	24/26	19/21		Si 1,5/2,5
	UNS S31254	14.547		0,02	19,5/20,5	17,5/18,5	6,0/6,5	Cu 0,50/1,00 N 0,18/0,22
High Nickel	UNS S31803	1.4462	U Z 2 CND 22-05-03	0,03	21/23	4,5/6,5	2,5/3,5	N 0,12/0,20
	UNS S32750				24,0/26,0	6,0/8,0	3,0/5,0	
	UNS S32760	1.4501	TU Z 3 CND 25-06-Az	0,03	24/26	6/8	3/5	N 0,2/0,3 Cu & W 0,5/1,0
High Nickel	904 L	1.4539	TU Z 1 CNDU 25-20	0,02	19/21	24/26	4/5	Cu 1,20/2,00 N 0,04/0,10
	800-H-HT	1.4876	(TU Z10 NC 32-21)	0,6/0,10	19/23	30/35		Al & Ti 0,15/0,60
	UNS N08020	2.4660		0,07	19/21	32/38	2/3	Cu 3/4 Nb 8xC-1,0 Fe Balance
	UNS N08825	2.4858		0,05	19,5/23,5	38/46	2,5/3,5	Cu 1,5/3,0 Al 0,2 max Ti 0,6/1,2 Fe Balance
	UNS N08028	1.4563	TU Z2 CNDU 31-27	0,03	26/28	30/32	3/4	Cu=0,8/1,4 N=0,04/0,15 Fe Balance
	G-3 N06985				21,0/23,5	44,0/52,0	6,5/8,0	Fe: 18,0/21,0

In 2013, a new finishing line exclusively devoted to production of CRA materials for CO<sub>2</sub> injection and storare. This state of the art line, along with the rest of Tubacex Group's manufacturing capabilities, covers the following range:

OCTG: TUBACEX MANUFACTURING RANGE							
Steel	Grade	2 3/8"-2 7/8"	3 1/2"-4 1/2"	5"-5 1/2"	6 5/8"-7"	7 5/8"-7 3/4"	8 5/8"-9 5/8"
22Cr	65	R3	R3	R3	R3	R2/R3	R3
	110	R3	R3	R3	R3	R3	
	125	R3	R3	R3	R3	R2 /R3	R3
25Cr	80	R3	R3	R3	R3	R3	R3
	125	R3	R3	R3	R3	R2/R3	R3
28Cr	110	R3	R3	R3	R3	R2/R3	R3
	125	R3	R3	R3	R3	R2/R3	R3
	140	R3	R3	R3			
	110	R3	R3	R3			
825	110	R3	R3	R3	R3	R2/R3	R3
	110	R3	R3	R3	R3	R2/R3	R3
G3	125	R3	R3	R3	R2/R3	R2/R3	
	110	R3	R3	R3	R3	R3	R3
G50	110	R3	R3	R3	R2/R3	R2/R3	R3
	125	R3	R3	R3	R2/R3	R2/R3	R3