

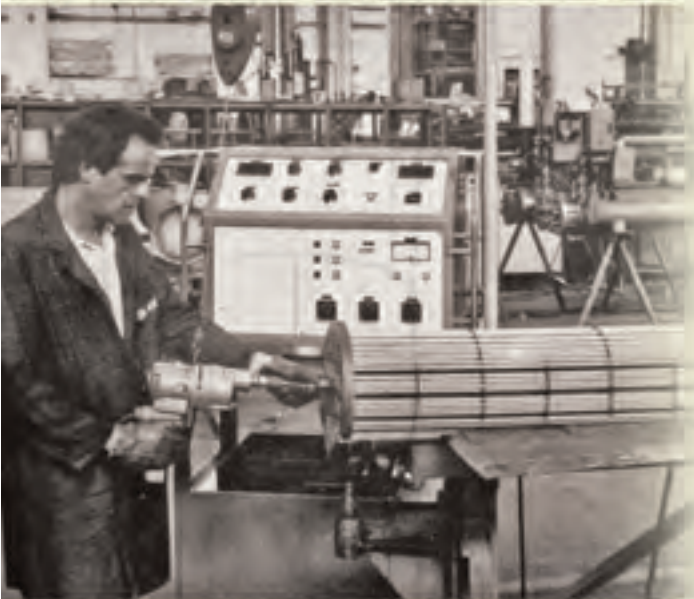


Tube expanders

MG/800
MG/1200



MADE IN ITALY



Historical note



Franco Agostino
Founder

MAUS
ITALIA

since 1961

The rolling expansion of tubes can be traced back to nineteenth century industrial England. The manufacture of steam boilers for the great steam ships, locomotives and industry lead to the construction of the first rudimentary tube expanders. The end of the nineteenth century provides firm documentary evidence with the founding of the first tube expander factory in the United States. In Germany too, during the inter-war years, some small workshops devoted a part of their work to the production of these tools. The enormous investments in oil refineries, petrochemical and chemical industries, power stations, the development of air conditioning systems, desalination and many other sectors, gave rise to corresponding increases in energy consumption. This lead to the design of increasingly large and more sophisticated tube bundle heat exchangers, with a great variety of design features, materials and configurations.

It was in this development context at the end of the nineteen fifties that Mr. Franco Agostino was afforded the opportunity to learn the art of making tube expanders by an old German manufacturer, Mr Albert Otto. From that time, and thanks to the determination and perseverance of these men, Mr. Agostino was able to start up the small Italian factory that a few years later became, Maus Italia.

Today Maus Italia has risen to a position of world leadership thanks to the tireless work of many collaborators and the belief of an Italian clientele which is exceptionally active in the international marketplace.

With the publication of this new catalogue, Maus Italia wishes to make the technician's job of choosing the right product easier.



The company

In 1961 Mr Franco Agostino, the founder of the company, acquired German know-how and permission to manufacture pipe expanders in Italy. In 1972, he moved Maus Italia to its new headquarters and laid the foundations for the development that he entrusted to his son Stefano, a mechanical engineer, who has been devoting all his efforts since 1976 to placing Maus Italia at the top of the European and world markets.

The PC and CAD functional work environment, computer-controlled production, automatic storage, CNC machine tools and the enthusiasm and skill of its young and capable technicians have created the winning combination that has made Maus Italia the world's leading proponent of this technology.

The company objective is to:

- plan, produce and market tools and machines for the production and maintenance of exchangers, condensers, refrigerators or boilers of chemical plants, oil refineries, power stations, sugar factories, etc.
- accept market challenges to accelerate in-house research in order to provide customers with technological machines and tools that tailored to their specific needs

From the simplest tool to automatic expansion systems each component part is designed, built, assembled and tested in order to guarantee high-level product security that will satisfy all requirements even in the most difficult situations.

Experience, quality, continuous innovation and a carefully cultivated image have made Maus Italia the market leader in Europe and one of the world leaders.

This result is due to the commitment of its entire staff to working together to ensure the company continuous and unceasing growth.

Dozens of problems are examined and solved daily by our technical office, which always comes up with the most suitable solutions. Over thirty years of dealings with the market mean enable Maus Italia to provide the answers to the most widely differing problems. A staff of qualified technicians provides customers with an after-sales service.



Symbols

Pages nn



Turn to page nn



Tube expanders - MG series

Choosing the right tube expander MG- 4

General table MG- 5

With 1.1/2" short rolls

MG/800 MG- 6

MG/1200 MG- 12

With 2.1/4" long rolls

MG/800 MG- 9

MG/1200 MG- 15

Other works MG-18



DNV BUSINESS ASSURANCE MANAGEMENT SYSTEM CERTIFICATE

Certification No. / Certificazione No. CERT-066495-AQ-SOL-SINCERT

Stato/area/ Paese / This is a single item

M.A.U.S. ITALIA Di F. Agostino & C. S.a.s.

S.S. P.lelase Km 30 - 26013 Bagnolo Cremasco (CR) - Italy

Il/ L'instauratore/operatore della norma per i sistemi di gestione:
This issue formal to conform to the management system standard:

UNI EN ISO 9001:2008 (ISO 9001:2008)

Questa certificazione è valida per il seguente campo applicativo:
This Certificate is valid for the following product or service range:

Progettazione e produzione di mandrini allungabili, macchine per mandrinare e macchine
per la manutenzione di scambiatori di calore (Settore EA : 17 - 18)

Design and production of tube expanders, rolling equipment and machines for maintenance
of heat exchangers (Sector EA : 17 - 18)

When/When Issued/Initial Certificate Date:

1993-04-18

Il/ Certificate is valid from:

This Certificate is valid until:

2013-03-20

Il/ Valid if main supplier under the supervision of:
The valid has been performed under the
supervision of:

Andrea Barile
Lead Auditor



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Company Name / Place and date:

Agate Brianza, (MI) 2012-03-27

Per l'Organismo di Certificazione:

Per the Issuing Body:

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Zeno Refram
Management Representative

La validità del presente certificato è subordinata al rispetto delle condizioni contenute nel regolamento di certificazione.

The validity of this certificate is conditional on compliance with the conditions contained in the certification rules.

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The validity of this certificate is conditional on compliance with the conditions contained in the certification rules.



Tube expanders MG series

The **MG**-series variable depth tube expanders have been designed for rolling tubes in heat exchangers. They are driven by pneumatic or electric rolling machines with torque control produced by Maus Italia.

As with all Maus Italia products the **MG**-series tube expanders are of the highest quality:

- made of special tempered and case-hardened alloy steels;
- fitted with an adjustable thrust collar with ball-thrust bearing;
- all rolling surfaces ground: 1 mandrel and 3 rolls;
- a self-locking nut and washer is fitted on the frontal of the mandrel to stop it from unscrewing out of the cage.



Choosing the right tube expander MG series for heat-exchangers and condensers.

The choice of series and size of tube expander is based on certain technical parameters, the basic data being the dimensions of the tube and the depth of rolling.

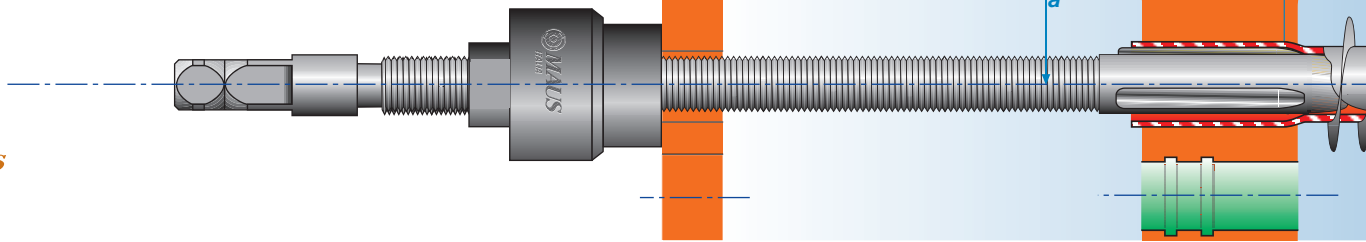
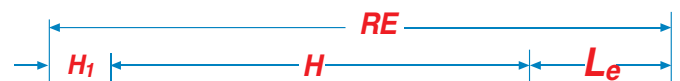
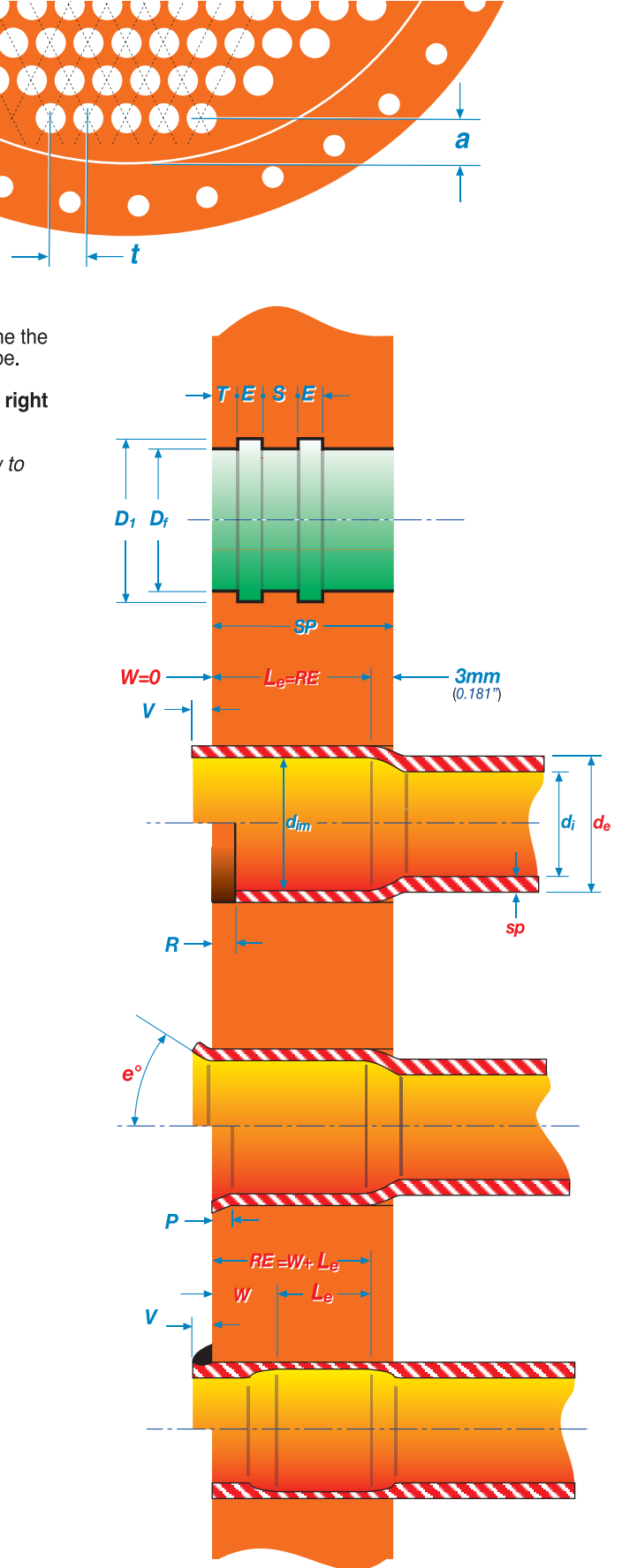
With the help of the legend below and table on the next page, it is possible to get a rough idea for identifying the right series.

Once the tube expander series has been identified it is easy to determine the size from the specification tables according to the dimensions of the tube.

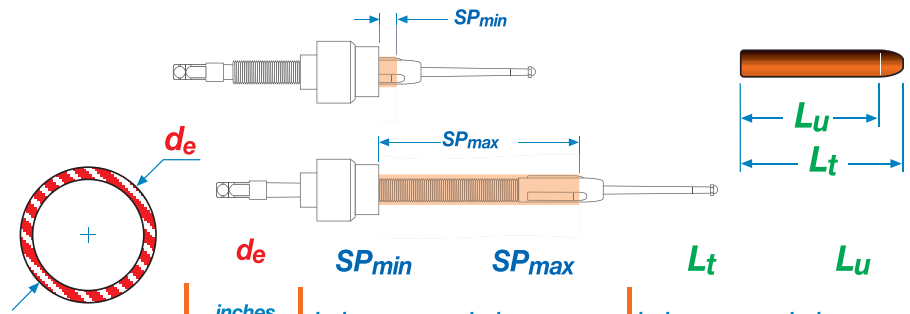
However, our technicians are at your disposal to help in making the right choice and if necessary they can suggest special versions.

Once the required information has been gathered, use the tables below to determine the suitable tube expander series

d_e	tube outside diameter
sp	tube wall thickness
RE	rolling depth
L_e	rolling length
W	distance of the rolling from the edge of the tube-sheet
H	depth of the water chamber (if any)
H_1	thickness of the water chamber plate (if any)
e°	angle of flaring in the expanded tube (if required)
d_i	tube inside diameter
d_{im}	inside diameter of the expanded tube
V	protrusion of the tube from the tube-sheet-standard = 0.118" (3mm)
R	distance of the tube from the edge of the tube-sheet
P	depth of flaring of the hole in the tube-sheet
D_f	diameter of the hole in the tube-sheet
SP	tube-sheet thickness
a	distance between the first hole and the inside diameter of the shell
t	rolling step
D_1	groove diameter
E	width of the grooves
S	distance between the grooves
T	distance between the tube-sheet edge and the first groove
$m_1(y_{p1})$	tube material compliant with standards (yield point)
$m_2(y_{p2})$	tube-sheet material compliant with standards (yield point)
n	Number of tubes to be rolled



General table of tube expanders MG series

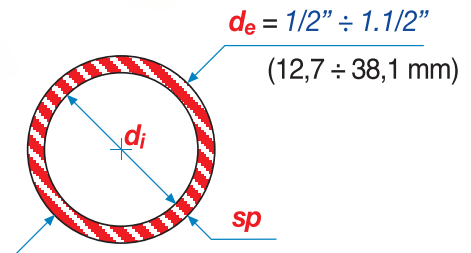
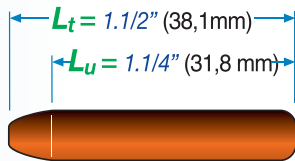


	MG/800	MG/1200	MG/1200-B	MG/1200-C	d_e	SP_{min}	SP_{max}	L_t		L_u		MG-nn		
								inches	mm	inches	mm		inches	mm
Short rolls	With 1.1/2" short rolls				1/2" ÷ 1.1/2" 12,7 ÷ 38,1	1/2"	12,7	1.1/2"	38,1	1.1/2"	38,1	1.1/4"	31,8	MG-6
	5"	127,0	MG-12											
	9"	228,6		MG-12										
	11"	279,4						MG-12						
Long rolls	With 2.1/4" long rolls				1/2" ÷ 1.1/2" 12,7 ÷ 38,1	1.1/4"	31,8	2.1/4"	57,1	2.1/4"	57,1	2"	58,8	MG-9
	5.3/4"	146,0	MG-15											
	9.3/4"	247,6		MG-15										
	11.3/4"	298,4						MG-15						

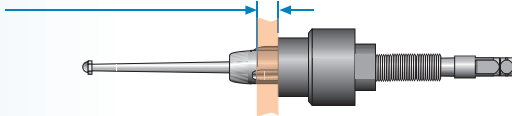


Tube expanders with adjustable reach For low thickness tube-sheets

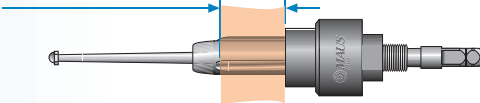
MG/800 With **1.1/2"** short rolls



$SP_{min} = 1/2" (12,7 \text{ mm})$



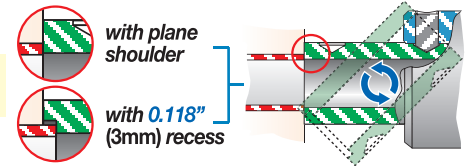
$SP_{max} = 1.1/2" (38,1 \text{ mm})$



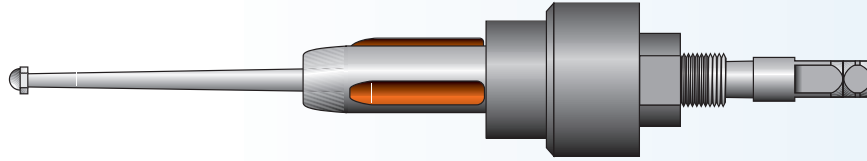
Sample code for ordering tube expanders
 $d_e 1" - 14 \text{ B.W.G.}$

New reversible thrust collar design


MG-849



d_e inches mm	Tube				Expansion		Tube expander	Rolls	Mandrel	inches mm	
	B.W.G.	sp inches mm	d_i inches mm	d_i inches mm	inches	mm	Cod.	Cod.	Cod.		
1/2" (12,7)	14	0.083	2,10	0.334	8,4	0.324 ÷ 0.374	8,2 ÷ 9,5	MG-797	MR-797	MM-797	3/8" (9,5)
	15	0.072	1,82	0.356	9,0	0.348 ÷ 0.398	8,8 ÷ 10,1	MG-799	MR-1	MM-799	
	16	0.065	1,65	0.370	9,4	0.360 ÷ 0.410	9,1 ÷ 10,4	MG-801	MR-1	MM-1	
	17	0.058	1,47	0.384	9,7	0.374 ÷ 0.424	9,5 ÷ 10,7	MG-803	MR-2	MM-1	
	18	0.049	1,24	0.402	10,2	0.392 ÷ 0.447	9,9 ÷ 11,3	MG-805	MR-3	MM-2	
	20	0.035	0,88	0.430	10,9	0.420 ÷ 0.480	10,7 ÷ 12,1	MG-807	MR-4	MM-3	
5/8" (15,9)	12	0.109	2,76	0.407	10,3	0.392 ÷ 0.447	9,9 ÷ 11,3	MG-805	MR-3	MM-2	3/8" (9,5)
	13	0.095	2,41	0.435	11,0	0.425 ÷ 0.480	10,8 ÷ 12,1	MG-807	MR-4	MM-3	
	14	0.083	2,10	0.459	11,6	0.449 ÷ 0.509	11,4 ÷ 12,9	MG-809	MR-4	MM-4	
	15	0.072	1,82	0.481	12,2	0.471 ÷ 0.536	11,9 ÷ 13,6	MG-811	MR-5	MM-5	
	16	0.065	1,65	0.495	12,5	0.485 ÷ 0.550	12,3 ÷ 13,9	MG-813	MR-6	MM-5	
	17	0.058	1,47	0.509	12,9	0.499 ÷ 0.564	12,6 ÷ 14,3	MG-815	MR-6	MM-6	
	18	0.049	1,24	0.527	13,3	0.517 ÷ 0.572	13,1 ÷ 14,5	MG-817	MR-7	MM-7	
	19	0.042	1,06	0.541	13,7	0.522 ÷ 0.582	13,2 ÷ 14,7	MG-819	MR-7	MM-6	
	20	0.035	0,88	0.555	14,1	0.536 ÷ 0.596	13,6 ÷ 15,1	MG-819-SP	MR-7	MM-8	
	21	0.032	0,81	0.561	14,2						
	22	0.028	0,71	0.569	14,4						

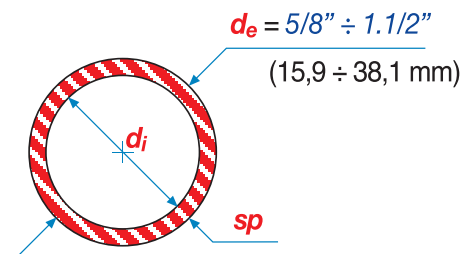
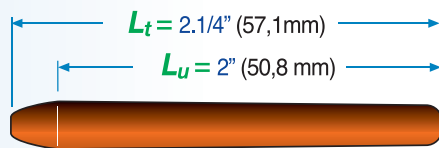


<i>de</i> inches mm	Tube				Expansion		Tube expander	Rolls	Mandrel	\square inches mm	
	B.W.G.	<i>sp</i> inches	mm	<i>di</i> inches	mm	inches	mm	Cod.	Cod.		Cod.
3/4" (19,0)	10	0.134	3,40	0.482	12,2	0.471 ÷ 0.536	11,9 ÷ 13,6	MG-811	MR-5	MM-5	3/8" (9,5)
	11	0.120	3,04	0.510	12,9	0.499 ÷ 0.564	12,6 ÷ 14,3	MG-815	MR-6	MM-6	
	12	0.109	2,76	0.532	13,5	0.522 ÷ 0.582	13,2 ÷ 14,7	MG-819	MR-7	MM-6	
	13	0.095	2,41	0.560	14,2	0.550 ÷ 0.615	13,9 ÷ 15,6	MG-821	MR-8	MM-8	
	14	0.083	2,10	0.584	14,8	0.574 ÷ 0.639	14,5 ÷ 16,2	MG-823	MR-9		
	15	0.072	1,82	0.606	15,3	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-825	MR-10	MM-9	
	16	0.065	1,65	0.620	15,7	0.605 ÷ 0.685	15,3 ÷ 17,4	MG-827	MR-10		
	17	0.058	1,47	0.634	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-829	MR-11	MM-9	
	18	0.049	1,24	0.652	16,5						
	19	0.042	1,06	0.666	16,9	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-831	MR-12	MM-9	
	20	0.035	0,88	0.680	17,2						
	21	0.032	0,81	0.686	17,4						
22	0.028	0,71	0.694	17,6							
7/8" (22,2)	10	0.134	3,40	0.607	15,4	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-825	MR-10	MM-8	3/8" (9,5)
	11	0.120	3,04	0.635	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-829	MR-11	MM-9	
	12	0.109	2,76	0.657	16,6	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-831	MR-12	MM-10	
	13	0.095	2,41	0.685	17,4	0.670 ÷ 0.750	17,0 ÷ 19,0	MG-833	MR-13	MM-10	
	14	0.083	2,10	0.709	18,0	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-835	MR-14	MM-11	
	15	0.072	1,82	0.731	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-837	MR-15	MM-12	
	16	0.065	1,65	0.745	18,9	0.726 ÷ 0.815	18,4 ÷ 20,7	MG-839	MR-15		
	17	0.058	1,47	0.759	19,2	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-843	MR-16		
18	0.049	1,24	0.777	19,7							
1" (25,4)	8	0.165	4,19	0.670	17,0	0.655 ÷ 0.735	16,6 ÷ 18,6	MG-841	MR-13	MM-9	3/8" (9,5)
	9	0.148	3,75	0.704	17,8	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-835	MR-14	MM-11	
	10	0.134	3,40	0.732	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-837	MR-15	MM-12	
	11	0.120	3,04	0.760	19,3	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-843	MR-16		
	12	0.109	2,76	0.782	19,8	0.763 ÷ 0.852	19,3 ÷ 21,6	MG-845	MR-17	MM-13	
	13	0.095	2,41	0.810	20,5	0.791 ÷ 0.880	20,0 ÷ 22,3	MG-847	MR-18		
	14	0.083	2,10	0.834	21,1	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-849	MR-18	MM-13	
	15	0.072	1,82	0.856	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-851	MR-19		
	16	0.065	1,65	0.870	22,1	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-855	MR-21	MM-13	
	17	0.058	1,47	0.884	22,4						
	18	0.049	1,24	0.902	22,9						
	19	0.042	1,06	0.916	23,2						
20	0.035	0,89	0.930	23,6							

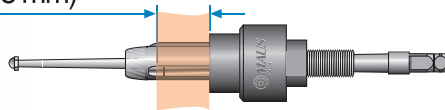
de inches mm	Tube					Expansion		Tube expander	Rolls	Mandrel	 inches mm
	B.W.G.	sp inches	mm	dj inches	mm	inches	mm	Cod.	Cod.	Cod.	
1.1/8" (28,5)	8	0.165	4,19	0.795	20,1	0.776 ÷ 0.875	19,7 ÷ 22,2	MG-853	MR-20	MM-13	3/8" (9,5)
	9	0.148	3,75	0.829	21,0	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-849	MR-18		
	10	0.134	3,40	0.857	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-851	MR-19		
	11	0.120	3,04	0.885	22,4	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-855	MR-21		
	12	0.109	2,76	0.907	23,0	0.883 ÷ 0.982	22,4 ÷ 24,9	MG-857	MR-21	MM-14	1/2" (12,7)
	13	0.095	2,41	0.935	23,7	0.916 ÷ 1.015	23,2 ÷ 25,7	MG-859	MR-22		
	14	0.083	2,10	0.959	24,3	0.935 ÷ 1.044	23,7 ÷ 26,5	MG-861	MR-23	MM-15	
	15	0.072	1,82	0.981	24,9	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-863	MR-24		
	16	0.065	1,65	0.995	25,2	0.990 ÷ 1.099	25,1 ÷ 27,9	MG-867	MR-26	MM-16	
	17	0.058	1,47	1.009	25,6						
18	0.049	1,24	1.027	26,0							
1.1/4" (31,8)	8	0.165	4,19	0.920	23,3	0.901 ÷ 1.010	22,8 ÷ 25,6	MG-865	MR-25	MM-15	1/2" (12,7)
	9	0.148	3,75	0.954	24,2	0.935 ÷ 1.044	23,7 ÷ 26,5	MG-861	MR-23		
	10	0.134	3,40	0.982	24,9	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-863	MR-24		
	11	0.120	3,04	1.010	25,6	0.990 ÷ 1.099	25,1 ÷ 27,9	MG-867	MR-26		
	12	0.109	2,76	1.032	26,2	1.013 ÷ 1.122	25,7 ÷ 28,5	MG-869	MR-27	MM-16	
	13	0.095	2,41	1.060	26,9	1.041 ÷ 1.150	26,4 ÷ 29,2	MG-871	MR-28		
	14	0.083	2,10	1.084	27,5	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-873	MR-29	MM-17	
	15	0.072	1,82	1.106	28,0	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-875	MR-30		
	16	0.065	1,65	1.120	28,4	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-879	MR-30	MM-18	
	17	0.058	1,47	1.134	28,8						
18	0.049	1,24	1.152	29,2							
1.3/8" (34,9)	8	0.165	4,19	1.045	26,5	1.026 ÷ 1.135	26,0 ÷ 28,8	MG-877	MR-31	MM-17	1/2" (12,7)
	9	0.148	3,75	1.079	27,4	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-873	MR-29		
	10	0.134	3,40	1.107	28,1	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-875	MR-30		
	11	0.120	3,04	1.135	28,8	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-879	MR-30		
	12	0.109	2,76	1.157	29,3	1.133 ÷ 1.242	28,7 ÷ 31,5	MG-881	MR-32	MM-18	
	13	0.095	2,41	1.185	30,1	1.160 ÷ 1.275	29,4 ÷ 32,3	MG-883	MR-33		
	14	0.083	2,10	1.209	30,7	1.179 ÷ 1.294	29,9 ÷ 32,8	MG-885	MR-34	MM-20	
	15	0.072	1,82	1.231	31,2	1.206 ÷ 1.321	30,6 ÷ 33,5	MG-887	MR-35		
	16	0.065	1,65	1.245	31,6						
	1.1/2" (38,1)	8	0.165	4,19	1.170	29,7	1.145 ÷ 1.260	29,0 ÷ 32,0	MG-889	MR-34	MM-19
9		0.148	3,75	1.204	30,5	1.177 ÷ 1.294	29,9 ÷ 32,8	MG-885	MR-34		
10		0.134	3,40	1.232	31,2	1.206 ÷ 1.321	30,6 ÷ 33,5	MG-887	MR-35	MM-20	
11		0.120	3,04	1.260	32,0	1.235 ÷ 1.350	31,3 ÷ 34,2	MG-891	MR-36		
12		0.109	2,76	1.282	32,5	1.257 ÷ 1.372	31,9 ÷ 34,8	MG-893	MR-37	MM-21	
13		0.095	2,41	1.310	33,2	1.285 ÷ 1.400	32,6 ÷ 35,5	MG-895	MR-37		
14		0.083	2,10	1.334	33,8	1.331 ÷ 1.446	33,8 ÷ 36,7	MG-897	MR-38		
15		0.072	1,82	1.356	34,4						
16		0.065	1,65	1.370	34,8	1.331 ÷ 1.472	33,8 ÷ 37,3	MG-899	MR-38		
17		0.058	1,47	1.384	35,1						
18		0.049	1,24	1.402	35,6						
19		0.042	1,06	1.416	35,9						
20		0.035	0,88	1.444	36,3						

Tube expanders with adjustable reach For medium thickness tube-sheets

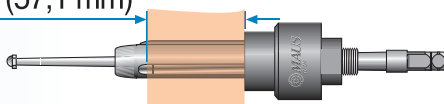
MG/800 With **2.1/4"**
long rolls



$SP_{min} = 1.1/4'' (31,8\text{ mm})$



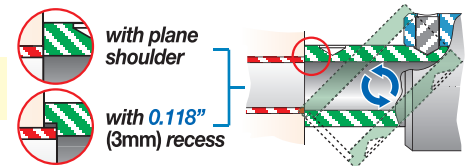
$SP_{max} = 2.1/4'' (57,1\text{ mm})$



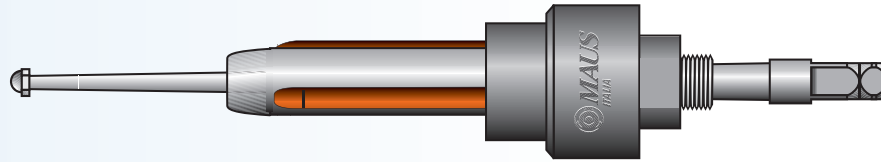
Sample code for
ordering tube expanders
 $d_e 1'' - 14\text{ B.W.G.}$

New reversible
thrust collar design


MG-850



d_e inches mm	Tube		Expansion		Tube expander	Rolls	Mandrel	\square inches mm
	B.W.G.	sp inches mm	d_i inches mm	inches mm	Cod.	Cod.	Cod.	
5/8" (15,8)	14	0.083 2,10	0.459 11,6	0.449 ÷ 0.509 11,4 ÷ 12,9	MG-810	MR-4-A	MM-4	3/8" (9,5)
	15	0.072 1,82	0.481 12,2	0.471 ÷ 0.536 11,9 ÷ 13,6	MG-812	MR-5-A	MM-5	
	16	0.065 1,65	0.495 12,5	0.485 ÷ 0.550 12,3 ÷ 13,9	MG-814	MR-6-A	MM-5	
	17	0.058 1,47	0.509 12,9	0.499 ÷ 0.564 12,6 ÷ 14,3	MG-816	MR-6-A	MM-6	
	18	0.049 1,24	0.527 13,3	0.517 ÷ 0.572 13,1 ÷ 14,5	MG-818	MR-7-A	MM-7	
	19	0.042 1,06	0.541 13,7	0.522 ÷ 0.582 13,2 ÷ 14,7	MG-820	MR-7-A	MM-6	
	20	0.035 0,88	0.555 14,1	0.536 ÷ 0.596 13,6 ÷ 15,1	MG-820-SP	MR-7-A	MM-8	
	21	0.032 0,81	0.561 14,2					
	22	0.028 0,71	0.569 14,4					

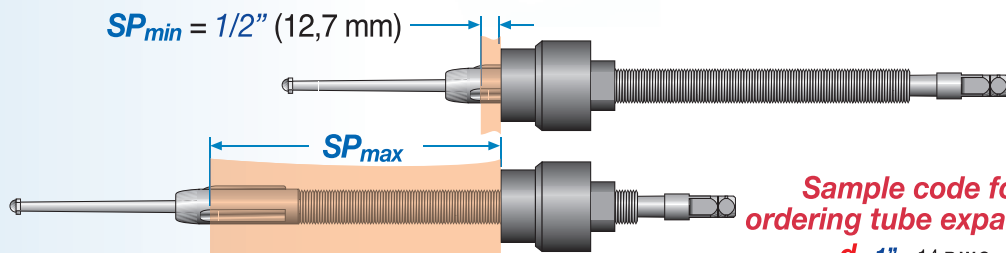
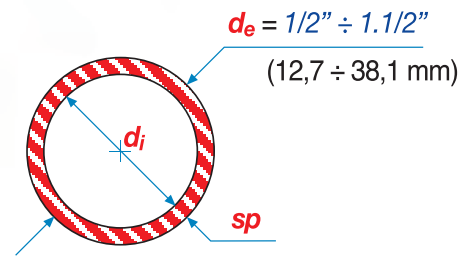
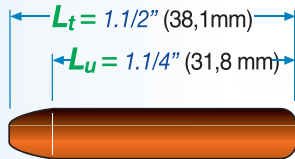


de inches mm	Tube					Expansion		Tube expander	Rolls	Mandrel	\square inches mm
	B.W.G.	sp inches mm	mm	di inches mm	mm	inches	mm	Cod.	Cod.	Cod.	
3/4" (19,0)	10	0.134	3,40	0.482	12,2	0.471 ÷ 0.536	11,9 ÷ 13,6	MG-812	MR-5-A	MM-5	3/8" (9,5)
	11	0.120	3,05	0.510	12,9	0.499 ÷ 0.564	12,6 ÷ 14,3	MG-816	MR-6-A	MM-6	
	12	0.109	2,76	0.532	13,5	0.522 ÷ 0.582	13,2 ÷ 14,7	MG-820	MR-7-A	MM-6	
	13	0.095	2,41	0.560	14,2	0.550 ÷ 0.615	13,9 ÷ 15,6	MG-822	MR-8-A	MM-8	
	14	0.083	2,10	0.584	14,8	0.574 ÷ 0.639	14,5 ÷ 16,2	MG-824	MR-9-A		
	15	0.072	1,82	0.606	15,3	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-826	MR-10-A	MM-9	
	16	0.065	1,65	0.620	15,7	0.605 ÷ 0.685	15,3 ÷ 17,4	MG-828	MR-10-A		
	17	0.058	1,47	0.634	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-830	MR-11-A	MM-9	
	18	0.049	1,24	0.652	16,5						
	19	0.042	1,06	0.666	16,9	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-832	MR-12-A	MM-9	
	20	0.035	0,88	0.680	17,2						
	21	0.032	0,81	0.686	17,4						
22	0.028	0,71	0.694	17,6							
7/8" (22,2)	10	0.134	3,40	0.607	15,4	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-826	MR-10-A	MM-8	3/8" (9,5)
	11	0.120	3,04	0.635	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-830	MR-11-A	MM-9	
	12	0.109	2,76	0.657	16,6	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-832	MR-12-A	MM-10	
	13	0.095	2,41	0.685	17,4	0.670 ÷ 0.750	17,0 ÷ 19,0	MG-834	MR-13-A	MM-10	
	14	0.083	2,10	0.709	18,0	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-836	MR-14-A	MM-11	
	15	0.072	1,82	0.731	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-838	MR-15-A	MM-12	
	16	0.065	1,65	0.745	18,9	0.726 ÷ 0.815	18,4 ÷ 20,7	MG-840	MR-15-A		
	17	0.058	1,47	0.759	19,2	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-844	MR-16-A	MM-12	
	18	0.049	1,24	0.777	19,7						
1" (25,4)	8	0.165	4,19	0.670	17,0	0.665 ÷ 0.735	16,6 ÷ 18,6	MG-842	MR-13-A	MM-9	3/8" (9,5)
	9	0.148	3,75	0.704	17,8	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-836	MR-14-A	MM-11	
	10	0.134	3,40	0.732	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-838	MR-15-A	MM-12	
	11	0.120	3,04	0.760	19,3	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-844	MR-16-A		
	12	0.109	2,76	0.782	19,8	0.763 ÷ 0.852	19,3 ÷ 21,6	MG-846	MR-17-A	MM-13	
	13	0.095	2,41	0.810	20,5	0.791 ÷ 0.880	20,0 ÷ 22,3	MG-848	MR-18-A		
	14	0.083	2,10	0.834	21,1	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-850	MR-18-A	MM-13	
	15	0.072	1,82	0.856	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-852	MR-19-A		
	16	0.065	1,65	0.870	22,1						
	17	0.058	1,47	0.884	22,4	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-856	MR-21-A	MM-13	
	18	0.049	1,24	0.902	22,9						
	19	0.042	1,06	0.916	23,2						
20	0.035	0,88	0.930	23,6							

<i>de</i> inches mm	Tube					Expansion		Tube expander	Rolls	Mandrel	 inches mm
	B.W.G.	<i>sp</i>		<i>di</i>		inches	mm	Cod.	Cod.	Cod.	
		inches	mm	inches	mm						
1.1/8" (28,5)	8	0.165	4,19	0.795	20,1	0.776 ÷ 0.875	19,7 ÷ 22,2	MG-854	MR-20-A	MM-13	3/8" (9,5)
	9	0.148	3,75	0.829	21,0	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-850	MR-18-A		
	10	0.134	3,40	0.857	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-852	MR-19-A		
	11	0.120	3,04	0.885	22,4	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-856	MR-21-A	MM-14	
	12	0.109	2,76	0.907	23,0	0.883 ÷ 0.982	22,4 ÷ 24,9	MG-858	MR-21-A		
	13	0.095	2,41	0.935	23,7	0.916 ÷ 1.015	23,2 ÷ 25,7	MG-860	MR-22-A	MM-15	1/2" (12,7)
	14	0.083	2,10	0.959	24,3	0.935 ÷ 1.044	23,7 ÷ 26,5	MG-862	MR-23-A		
	15	0.072	1,82	0.981	24,9	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-864	MR-24-A	MM-16	
	16	0.065	1,65	0.995	25,2						
	17	0.058	1,47	1.009	25,6	0.990 ÷ 1.099	25,1 ÷ 27,9	MG-868	MR-26-A		
1.1/4" (31,8)	8	0.165	4,19	0.920	23,3	0.901 ÷ 1.010	22,8 ÷ 25,6	MG-866	MR-25-A	MM-15	
	9	0.148	3,75	0.954	24,2	0.935 ÷ 1.044	23,7 ÷ 26,5	MG-862	MR-23-A		
	10	0.134	3,40	0.982	24,9	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-864	MR-24-A		
	11	0.120	3,04	1.010	25,6	0.990 ÷ 1.099	25,2 ÷ 27,9	MG-868	MR-26-A	MM-16	
	12	0.109	2,76	1.032	26,2	1.013 ÷ 1.122	25,7 ÷ 28,5	MG-870	MR-27-A		
	13	0.095	2,41	1.060	26,9	1.041 ÷ 1.150	26,4 ÷ 29,2	MG-872	MR-28-A	MM-17	1/2" (12,7)
	14	0.083	2,10	1.084	27,5	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-874	MR-29-A		
	15	0.072	1,82	1.106	28,0	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-876	MR-30-A	MM-18	
	16	0.065	1,65	1.120	28,4						
	17	0.058	1,47	1.134	28,8	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-880	MR-30-A		
1.3/8" (34,9)	8	0.165	4,19	1.045	26,5	1.026 ÷ 1.135	26,0 ÷ 28,8	MG-878	MR-31-A	MM-17	
	9	0.148	3,75	1.079	27,4	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-874	MR-29-A		
	10	0.134	3,40	1.107	28,1	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-876	MR-30-A		
	11	0.120	3,04	1.135	28,8	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-880	MR-30-A	MM-18	1/2" (12,7)
	12	0.109	2,76	1.157	29,3	1.133 ÷ 1.242	28,7 ÷ 31,5	MG-882	MR-32-A		
	13	0.095	2,41	1.185	30,1	1.160 ÷ 1.275	29,4 ÷ 32,3	MG-884	MR-33-A	MM-19	
	14	0.083	2,10	1.209	30,7						
	15	0.072	1,82	1.231	31,2	1.179 ÷ 1.294	29,9 ÷ 32,8	MG-886	MR-34-A	MM-20	
	16	0.065	1,65	1.245	31,6	1.206 ÷ 1.321	30,6 ÷ 33,5	MG-888	MR-35-A		
	1.1/2" (38,1)	8	0.165	4,19	1.170	29,7	1.145 ÷ 1.260	29,0 ÷ 32,0	MG-890	MR-34-A	MM-19
9		0.148	3,75	1.204	30,5	1.177 ÷ 1.294	29,9 ÷ 32,8	MG-886	MR-34-A		
10		0.134	3,40	1.232	31,2	1.206 ÷ 1.321	30,6 ÷ 33,5	MG-888	MR-35-A		
11		0.120	3,04	1.260	32,0	1.235 ÷ 1.350	31,3 ÷ 34,2	MG-892	MR-36-A	MM-20	
12		0.109	2,76	1.282	32,5	1.257 ÷ 1.372	31,9 ÷ 34,8	MG-894	MR-37-A		
13		0.095	2,41	1.310	33,2	1.285 ÷ 1.400	32,6 ÷ 35,5	MG-896	MR-37-A	MM-21	1/2" (12,7)
14		0.083	2,10	1.334	33,8						
15		0.072	1,82	1.356	34,4	1.331 ÷ 1.446	33,8 ÷ 36,7	MG-898	MR-38-A	MM-22	
16		0.065	1,65	1.370	34,8						
17		0.058	1,47	1.384	35,1						
18	0.049	1,24	1.402	35,6	1.331 ÷ 1.472	33,8 ÷ 37,3	MG-800	MR-38-A			
19	0.042	1,06	1.416	35,9							
20	0.035	0,88	1.430	36,3							

Tube expanders with adjustable reach For thick tube-sheets

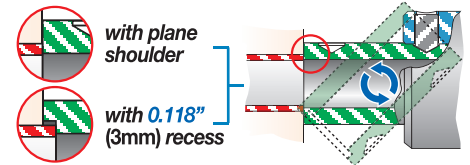
MG/1200 With 1.1/2" short rolls



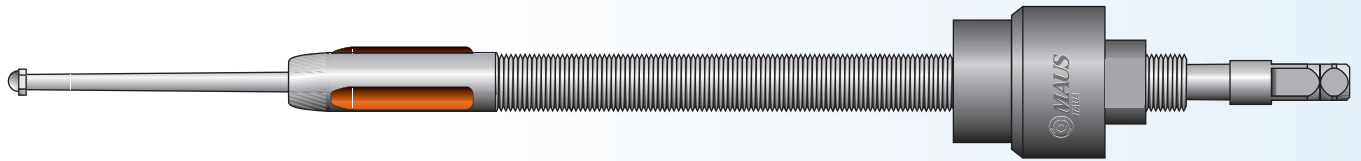
Sample code for ordering tube expanders
 $d_e 1" - 14 \text{ B.W.G.}$

New reversible thrust collar design

- Standard reach **STD** $SP_{max} = 5" (127,0\text{ mm})$ ↔ **MG-1249**
- Extra reach **B** $SP_{max} = 9" (228,6\text{ mm})$ ↔ **MG-1249-B**
- Extra reach **C** $SP_{max} = 11" (279,4\text{ mm})$ ↔ **MG-1249-C**



d_e inches mm	Tube				Expansion		Tube expander	Rolls	Mandrel	\square inches mm	
	B.W.G.	sp inches mm	d_i inches mm	d_i inches mm	inches	mm	Cod.	Cod.	Cod.		
1/2" (12,7)	14	0.083	2,10	0.334	8,4	0.324 ÷ 0.374	8,2 ÷ 9,5	MG-1197	MR-797	MM-1197	3/8" (9,5)
	15	0.072	1,82	0.356	9,0	0.348 ÷ 0.398	8,8 ÷ 10,1	MG-1199	MR-1	MM-1199	
	16	0.065	1,65	0.370	9,4	0.360 ÷ 0.410	9,1 ÷ 10,4	MG-1201	MR-1	MM-51	
	17	0.058	1,47	0.384	9,7	0.374 ÷ 0.424	9,5 ÷ 10,7	MG-1203	MR-2	MM-52	
	18	0.049	1,24	0.402	10,2	0.392 ÷ 0.447	9,9 ÷ 11,3	MG-1205	MR-3	MM-53	
	20	0.035	0,88	0.430	10,9	0.420 ÷ 0.480	10,7 ÷ 12,1	MG-1207	MR-4	MM-53	
5/8" (15,8)	12	0.109	2,76	0.407	10,3	0.392 ÷ 0.447	9,9 ÷ 11,3	MG-1205	MR-3	MM-52	3/8" (9,5)
	13	0.095	2,41	0.435	11,0	0.425 ÷ 0.480	10,8 ÷ 12,1	MG-1207	MR-4	MM-53	
	14	0.083	2,10	0.459	11,6	0.449 ÷ 0.509	11,4 ÷ 12,9	MG-1209	MR-4	MM-54	
	15	0.072	1,82	0.481	12,2	0.471 ÷ 0.536	11,9 ÷ 13,6	MG-1211	MR-5	MM-55	
	16	0.065	1,65	0.495	12,5	0.485 ÷ 0.550	12,3 ÷ 13,9	MG-1213	MR-6	MM-55	
	17	0.058	1,47	0.509	12,9	0.499 ÷ 0.564	12,6 ÷ 14,3	MG-1215	MR-6	MM-56	
	18	0.049	1,24	0.527	13,3	0.517 ÷ 0.572	13,1 ÷ 14,5	MG-1217	MR-7	MM-57	
	19	0.042	1,06	0.541	13,7	0.522 ÷ 0.582	13,2 ÷ 14,5	MG-1219	MR-7	MM-56	
	20	0.035	0,88	0.555	14,1	0.536 ÷ 0.596	13,6 ÷ 15,1	MG-1219-SP	MR-7	MM-58	
	21	0.032	0,81	0.561	14,2						
	22	0.028	0,71	0.569	14,4						

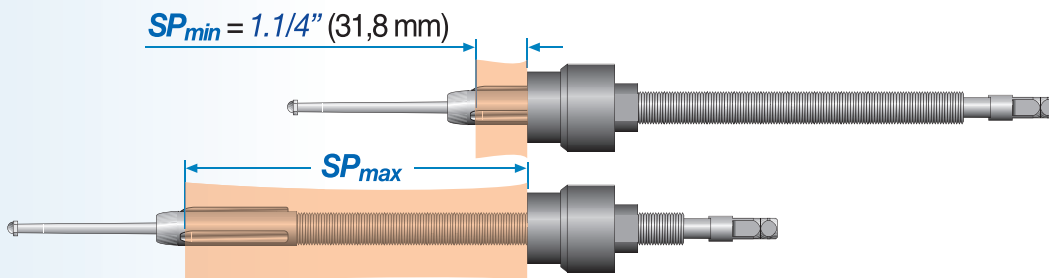
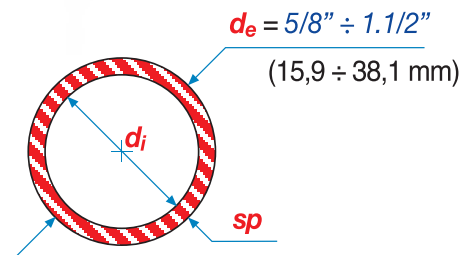
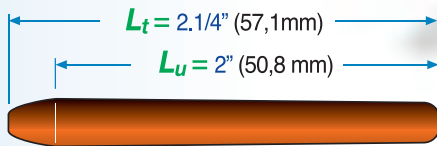


d_e inches mm	Tube				Expansion		Tube expander	Rolls	Mandrel	\square inches mm	
	B.W.G.	sp inches mm	d_i inches mm	d_i inches mm	inches	mm	Cod.	Cod.	Cod.		
3/4" (19,0)	10	0.134	3,40	0.482	12,2	0.471 ÷ 0.536	11,9 ÷ 13,6	MG-1211	MR-5	MM-55	3/8" (9,5)
	11	0.120	3,04	0.510	12,9	0.499 ÷ 0.564	12,6 ÷ 14,3	MG-1215	MR-6	MM-56	
	12	0.109	2,76	0.532	13,5	0.422 ÷ 0.582	13,2 ÷ 14,7	MG-1219	MR-7	MM-56	
	13	0.095	2,41	0.560	14,2	0.550 ÷ 0.615	13,9 ÷ 15,6	MG-1221	MR-8	MM-58	
	14	0.083	2,10	0.584	14,8	0.574 ÷ 0.639	14,5 ÷ 16,2	MG-1223	MR-9		
	15	0.072	1,82	0.606	15,3	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-1225	MR-10	MM-59	
	16	0.065	1,65	0.620	15,7	0.605 ÷ 0.685	15,3 ÷ 17,4	MG-1227	MR-10		
	17	0.058	1,47	0.634	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-1229	MR-11	MM-59	
	18	0.049	1,24	0.652	16,5						
	19	0.042	1,06	0.666	16,9	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-1231	MR-12	MM-59	
	20	0.035	0,88	0.680	17,2						
	21	0.032	0,81	0.686	17,4						
22	0.028	0,71	0.694	17,6							
7/8" (22,2)	10	0.134	3,40	0.607	15,4	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-1225	MR-10	MM-58	3/8" (9,5)
	11	0.120	3,04	0.635	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-1229	MR-11	MM-59	
	12	0.109	2,76	0.657	16,6	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-1231	MR-12	MM-60	
	13	0.095	2,41	0.685	17,4	0.670 ÷ 0.750	17,0 ÷ 19,0	MG-1233	MR-13	MM-61	
	14	0.083	2,10	0.709	18,0	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-1235	MR-14	MM-61	
	15	0.072	1,82	0.731	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-1237	MR-15	MM-62	
	16	0.065	1,65	0.745	18,9	0.726 ÷ 0.815	18,4 ÷ 20,7	MG-1239	MR-15		
	17	0.058	1,47	0.759	19,2	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-1243	MR-16	MM-62	
18	0.049	1,24	0.777	19,7							
1" (25,4)	8	0.165	4,19	0.670	17,0	0.665 ÷ 0.735	16,8 ÷ 18,6	MG-1241	MR-13	MM-59	3/8" (9,5)
	9	0.148	3,75	0.704	17,8	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-1235	MR-14	MM-61	
	10	0.134	3,40	0.732	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-1237	MR-15	MM-62	
	11	0.120	3,04	0.760	19,3	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-1243	MR-16		
	12	0.109	2,76	0.782	19,8	0.763 ÷ 0.852	19,3 ÷ 21,6	MG-1245	MR-17	MM-63	
	13	0.095	2,41	0.810	20,5	0.791 ÷ 0.880	20,0 ÷ 22,3	MG-1247	MR-18		
	14	0.083	2,10	0.834	21,1	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-1249	MR-18	MM-63	
	15	0.072	1,82	0.856	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-1251	MR-19		
	16	0.065	1,65	0.870	22,1						
	17	0.058	1,47	0.884	22,4	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-1255	MR-21	MM-63	
	18	0.049	1,24	0.902	22,9						
	19	0.042	1,06	0.916	23,2						
20	0.035	0,88	0.930	23,6							

de inches mm	Tube					Expansion		Tube expander	Rolls	Mandrel	□ inches mm
	B.W.G.	sp		dj		inches	mm	Cod.	Cod.	Cod.	
1.1/8" (28,5)	8	0.165	4,19	0.795	20,1	0.776 ÷ 0.875	19,7 ÷ 22,2	MG-1253	MR-20	MM-63	3/8" (9,5)
	9	0.148	3,75	0.829	21,0	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-1249	MR-18		
	10	0.134	3,40	0.857	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-1251	MR-19		
	11	0.120	3,04	0.885	22,4	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-1255	MR-21		
	12	0.109	2,76	0.907	23,0	0.883 ÷ 0.982	22,4 ÷ 24,9	MG-1257	MR-21		
	13	0.095	2,41	0.935	23,7	0.916 ÷ 1.015	23,2 ÷ 25,7	MG-1259	MR-22	MM-64	1/2" (12,7)
	14	0.083	2,10	0.959	24,3	0.935 ÷ 1.044	23,7 ÷ 26,4	MG-1261	MR-23		
	15	0.072	1,82	0.981	24,9	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-1263	MR-24	MM-65	
	16	0.065	1,65	0.995	25,2	0.990 ÷ 1.099	25,1 ÷ 27,9	MG-1267	MR-26	MM-66	
	17	0.058	1,47	1.009	25,6						
18	0.049	1,24	1.027	26,0							
1.1/4" (31,8)	8	0.165	4,19	0.920	23,3	0.901 ÷ 1.010	22,8 ÷ 25,6	MG-1265	MR-25	MM-65	1/2" (12,7)
	9	0.148	3,75	0.954	24,2	0.935 ÷ 1.044	23,7 ÷ 26,5	MG-1261	MR-23		
	10	0.134	3,40	0.982	24,9	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-1263	MR-24		
	11	0.120	3,04	1.010	25,6	0.990 ÷ 1.099	25,1 ÷ 27,9	MG-1267	MR-26	MM-66	
	12	0.109	2,76	1.032	26,2	1.013 ÷ 1.122	25,7 ÷ 28,5	MG-1269	MR-27		
	13	0.095	2,41	1.060	26,9	1.041 ÷ 1.150	26,4 ÷ 29,2	MG-1271	MR-28	MM-67	
	14	0.083	2,10	1.084	27,5	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-1273	MR-29		
	15	0.072	1,82	1.106	28,0	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-1275	MR-30	MM-67	
	16	0.065	1,65	1.120	28,4	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-1279	MR-30	MM-68	
	17	0.058	1,47	1.134	28,8						
18	0.049	1,24	1.152	29,2							
1.3/8" (34,9)	8	0.165	4,19	1.045	26,5	1.026 ÷ 1.135	26,0 ÷ 28,8	MG-1277	MR-31	MM-67	1/2" (12,7)
	9	0.148	3,75	1.079	27,4	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-1273	MR-29		
	10	0.134	3,40	1.107	28,1	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-1275	MR-30		
	11	0.120	3,04	1.135	28,8	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-1279	MR-30	MM-68	
	12	0.109	2,76	1.157	29,3	1.133 ÷ 1.242	28,7 ÷ 31,5	MG-1281	MR-32		
	13	0.095	2,41	1.185	30,1	1.160 ÷ 1.275	29,4 ÷ 32,3	MG-1283	MR-33	MM-69	
	14	0.083	2,10	1.209	30,7	1.179 ÷ 1.294	29,9 ÷ 32,8	MG-1285	MR-34		
	15	0.072	1,82	1.231	31,2	1.206 ÷ 1.321	30,6 ÷ 33,5	MG-1287	MR-35	MM-70	
	16	0.065	1,65	1.245	31,6						
	1.1/2" (38,1)	8	0.165	4,19	1.170	29,7	1.145 ÷ 1.260	29,0 ÷ 32,0	MG-1289	MR-34	
9		0.148	3,75	1.204	30,5	1.179 ÷ 1.294	29,9 ÷ 32,8	MG-1285	MR-34		
10		0.134	3,40	1.232	31,2	1.206 ÷ 1.321	30,6 ÷ 35,5	MG-1287	MR-35	MM-70	
11		0.120	3,04	1.260	32,0	1.235 ÷ 1.350	31,3 ÷ 34,2	MG-1291	MR-36		
12		0.109	2,76	1.282	32,5	1.257 ÷ 1.372	31,9 ÷ 34,8	MG-1293	MR-37	MM-71	
13		0.095	2,41	1.310	33,2	1.285 ÷ 1.400	32,6 ÷ 35,5	MG-1295	MR-37		
14		0.083	2,11	1.334	33,9	1.331 ÷ 1.446	33,8 ÷ 36,7	MG-1297	MR-38	MM-72	
15		0.072	1,82	1.356	34,4	1.331 ÷ 1.472	33,8 ÷ 37,3	MG-1299	MR-38		
16		0.065	1,65	1.370	34,8						
17		0.058	1,47	1.384	35,1						
18	0.049	1,24	1.402	35,6							
19	0.042	1,06	1.416	35,9							
20	0.035	0,88	1.430	36,3							

Tube expanders with adjustable reach For thick tube-sheets

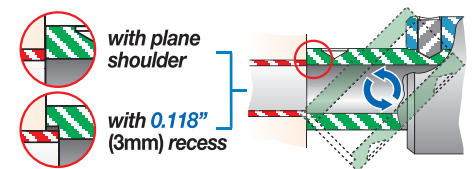
MG/1200 With 2.1/4" long rolls



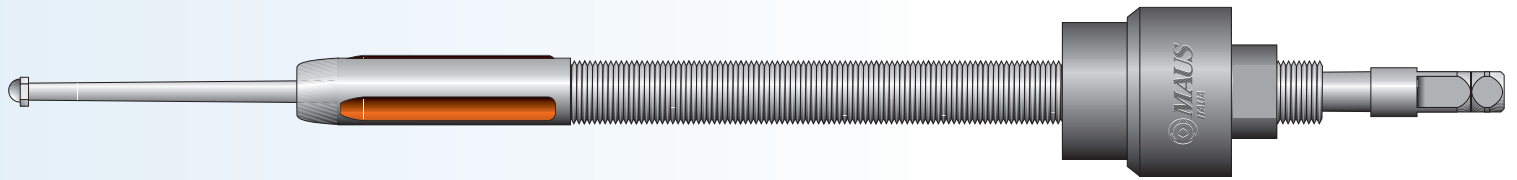
Sample code for ordering tube expanders
 d_e 1" - 14 B.W.G.

New reversible thrust collar design


Standard reach	STD	$SP_{max} = 5.3/4"$ (146,0 mm)	↔	MG/1250
Extra reach	B	$SP_{max} = 9.3/4"$ (247,6 mm)	↔	MG/1250-B
	C	$SP_{max} = 11.3/4"$ (298,4 mm)	↔	MG/1250-C



d_e inches mm	Tube		d_i		Expansion		Tube expander	Rolls	Mandrel	inches mm	
	B.W.G.	sp inches mm	inches mm	inches mm	inches mm	mm	Cod.	Cod.	Cod.		
5/8" (15,8)	14	0.083	2,10	0.459	11,6	0.449 ÷ 0.509	11,4 ÷ 12,9	MG-1210	MR-4-A	MM-54	3/8" (9,5)
	15	0.072	1,82	0.481	12,2	0.471 ÷ 0.536	11,9 ÷ 13,6	MG-1212	MR-5-A	MM-55	
	16	0.065	1,65	0.495	12,5	0.485 ÷ 0.550	12,3 ÷ 13,9	MG-1214	MR-6-A	MM-55	
	17	0.058	1,47	0.509	12,9	0.499 ÷ 0.564	12,6 ÷ 14,3	MG-1216	MR-6-A	MM-56	
	18	0.049	1,24	0.527	13,3	0.517 ÷ 0.572	13,1 ÷ 14,5	MG-1218	MR-7-A	MM-57	
	19	0.042	1,06	0.541	13,7	0.522 ÷ 0.582	13,2 ÷ 14,7	MG-1220	MR-7-A	MM-56	
	20	0.035	0,88	0.555	14,1	0.536 ÷ 0.596	13,6 ÷ 15,1	MG-1220-SP	MR-7-A	MM-58	
	21	0.032	0,81	0.561	14,2						
	22	0.028	0,71	0.569	14,4						



d_e inches mm	Tube				Expansion		Tube expander	Rolls	Mandrel	\square inches mm	
	B.W.G.	s_p inches mm	d_i inches mm	d_i inches mm	inches	mm	Cod.	Cod.	Cod.		
3/4" (19,0)	10	0.134	3,40	0.482	12,2	0.471 ÷ 0.536	11,9 ÷ 13,6	MG-1212	MR-5-A	MM-55	3/8" (9,5)
	11	0.120	3,04	0.510	12,9	0.499 ÷ 0.564	12,6 ÷ 14,3	MG-1216	MR-6-A	MM-56	
	12	0.109	2,76	0.532	13,5	0.522 ÷ 0.582	13,2 ÷ 14,7	MG-1220	MR-7-A	MM-56	
	13	0.095	2,41	0.560	14,2	0.550 ÷ 0.615	13,9 ÷ 15,6	MG-1222	MR-8-A	MM-58	
	14	0.083	2,10	0.584	14,8	0.574 ÷ 0.639	14,5 ÷ 16,2	MG-1224	MR-9-A		
	15	0.072	1,82	0.606	15,3	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-1226	MR-10-A	MM-59	
	16	0.065	1,65	0.620	15,7	0.605 ÷ 0.685	15,3 ÷ 17,4	MG-1228	MR-10-A		
	17	0.058	1,47	0.634	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-1230	MR-11-A	MM-59	
	18	0.049	1,24	0.652	16,5						
	19	0.042	1,06	0.666	16,9	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-1232	MR-12-A	MM-59	
	20	0.035	0,88	0.680	17,2						
	21	0.032	0,81	0.686	17,4	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-1232	MR-12-A	MM-59	
22	0.028	0,71	0.694	17,6							
7/8" (22,2)	10	0.134	3,40	0.607	15,4	0.596 ÷ 0.661	15,1 ÷ 16,7	MG-1226	MR-10-A	MM-58	3/8" (9,5)
	11	0.120	3,04	0.635	16,1	0.619 ÷ 0.699	15,7 ÷ 17,7	MG-1230	MR-11-A	MM-59	
	12	0.109	2,76	0.657	16,6	0.642 ÷ 0.722	16,3 ÷ 18,3	MG-1232	MR-12-A	MM-60	
	13	0.095	2,41	0.685	17,4	0.670 ÷ 0.750	17,0 ÷ 19,0	MG-1234	MR-13-A	MM-60	
	14	0.083	2,10	0.709	18,0	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-1236	MR-14-A	MM-61	
	15	0.072	1,82	0.731	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-1238	MR-15-A	MM-62	
	16	0.065	1,65	0.745	18,9	0.726 ÷ 0.815	18,4 ÷ 20,7	MG-1240	MR-15-A		
	17	0.058	1,47	0.759	19,2	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-1244	MR-16-A	MM-62	
18	0.049	1,24	0.777	19,7							
1" (25,4)	8	0.165	4,19	0.670	17,0	0.665 ÷ 0.735	16,8 ÷ 18,6	MG-1242	MR-13-A	MM-59	3/8" (9,5)
	9	0.148	3,75	0.704	17,8	0.685 ÷ 0.774	17,4 ÷ 19,6	MG-1236	MR-14-A	MM-61	
	10	0.134	3,40	0.732	18,5	0.712 ÷ 0.801	18,0 ÷ 20,3	MG-1238	MR-15-A	MM-62	
	11	0.120	3,04	0.760	19,3	0.740 ÷ 0.829	18,8 ÷ 21,0	MG-1244	MR-16-A		
	12	0.109	2,76	0.782	19,8	0.763 ÷ 0.852	19,3 ÷ 21,6	MG-1246	MR-17-A	MM-63	
	13	0.095	2,41	0.810	20,5	0.791 ÷ 0.880	20,0 ÷ 22,3	MG-1248	MR-18-A		
	14	0.083	2,10	0.834	21,1	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-1250	MR-18-A	MM-63	
	15	0.072	1,82	0.856	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-1252	MR-19-A		
	16	0.065	1,65	0.870	22,1						
	17	0.058	1,47	0.884	22,4	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-1256	MR-21-A	MM-63	
	18	0.049	1,24	0.902	22,9						
	19	0.042	1,06	0.916	23,2	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-1256	MR-21-A	MM-63	
20	0.035	0,88	0.930	23,6							

<i>d_e</i> inches mm	Tube					Expansion		Tube expander	Rolls	Mandrel	 inches mm
	B.W.G.	<i>sp</i>		<i>d_i</i>		inches	mm	Cod.	Cod.	Cod.	
		inches	mm	inches	mm						
1.1/8" (28,5)	8	0.165	4,19	0.795	20,1	0.776 ÷ 0.875	19,7 ÷ 22,2	MG-1254	MR-20-A		3/8" (9,5)
	9	0.148	3,75	0.829	21,0	0.810 ÷ 0.909	20,5 ÷ 23,0	MG-1250	MR-18-A	MM-63	
	10	0.134	3,40	0.857	21,7	0.837 ÷ 0.936	21,2 ÷ 23,7	MG-1252	MR-19-A		
	11	0.120	3,04	0.885	22,4	0.865 ÷ 0.964	21,9 ÷ 24,4	MG-1256	MR-21-A		1/2" (12,7)
	12	0.109	2,76	0.907	23,0	0.883 ÷ 0.982	22,4 ÷ 24,9	MG-1258	MR-21-A	MM-64	
	13	0.095	2,41	0.935	23,7	0.916 ÷ 1.015	23,2 ÷ 25,7	MG-1260	MR-22-A		
	14	0.083	2,10	0.959	24,3	0.935 ÷ 1.044	23,7 ÷ 26,4	MG-1262	MR-23-A		
	15	0.072	1,82	0.981	24,9	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-1264	MR-24-A	MM-65	
	16	0.065	1,65	0.995	25,2						
17	0.058	1,47	1.009	25,6	0.990 ÷ 1.099	25,1 ÷ 27,9	MG-1268	MR-26-A	MM-66		
18	0.049	1,24	1.027	26,0							
1.1/4" (31,8)	8	0.165	4,19	0.920	23,3	0.901 ÷ 1.010	22,8 ÷ 25,6	MG-1266	MR-25-A		1/2" (12,7)
	9	0.148	3,75	0.954	24,2	0.935 ÷ 1.044	23,7 ÷ 26,5	MG-1262	MR-23-A	MM-65	
	10	0.134	3,40	0.982	24,8	0.962 ÷ 1.071	24,4 ÷ 27,2	MG-1264	MR-24-A		
	11	0.120	3,04	1.010	25,6	0.990 ÷ 1.099	25,1 ÷ 27,9	MG-1268	MR-26-A	MM-66	
	12	0.109	2,76	1.032	26,2	1.013 ÷ 1.122	25,7 ÷ 28,5	MG-1270	MR-27-A		
	13	0.095	2,41	1.060	26,9	1.041 ÷ 1.150	26,4 ÷ 29,2	MG-1272	MR-28-A	MM-67	
	14	0.083	2,10	1.084	27,5	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-1274	MR-29-A		
	15	0.072	1,82	1.106	28,0	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-1276	MR-30-A	MM-67	
	16	0.065	1,65	1.120	28,4						
17	0.058	1,47	1.134	28,8	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-1280	MR-30-A	MM-68		
18	0.049	1,24	1.152	29,2							
1.3/8" (34,9)	8	0.165	4,19	1.045	26,5	1.026 ÷ 1.135	26,0 ÷ 28,8	MG-1278	MR-31-A		1/2" (12,7)
	9	0.148	3,75	1.079	27,4	1.060 ÷ 1.169	26,9 ÷ 29,6	MG-1274	MR-29-A	MM-67	
	10	0.134	3,40	1.107	28,1	1.087 ÷ 1.196	27,6 ÷ 30,3	MG-1276	MR-30-A		
	11	0.120	3,04	1.135	28,8	1.115 ÷ 1.224	28,3 ÷ 31,0	MG-1280	MR-30-A	MM-68	
	12	0.109	2,76	1.157	29,3	1.133 ÷ 1.242	28,7 ÷ 31,5	MG-1282	MR-32-A		
	13	0.095	2,41	1.185	30,1	1.160 ÷ 1.275	29,4 ÷ 32,3	MG-1284	MR-33-A	MM-69	
	14	0.083	2,10	1.209	30,7	1.179 ÷ 1.294	29,9 ÷ 32,8	MG-1286	MR-34-A		
	15	0.072	1,82	1.231	31,2	1.206 ÷ 1.321	30,6 ÷ 33,5	MG-1288	MR-35-A	MM-70	
	16	0.065	1,65	1.245	31,6						
1.1/2" (38,1)	8	0.165	4,19	1.170	29,7	1.145 ÷ 1.260	29,0 ÷ 32,0	MG-1290	MR-34-A	MM-69	1/2" (12,7)
	9	0.148	3,75	1.204	30,5	1.179 ÷ 1.294	29,9 ÷ 32,8	MG-1286	MR-34-A		
	10	0.134	3,40	1.232	31,2	1.206 ÷ 1.321	30,6 ÷ 35,5	MG-1288	MR-35-A	MM-70	
	11	0.120	3,04	1.260	32,0	1.235 ÷ 1.350	31,3 ÷ 34,2	MG-1292	MR-36-A		
	12	0.109	2,76	1.282	32,5	1.257 ÷ 1.372	31,9 ÷ 34,8	MG-1294	MR-37-A		
	13	0.095	2,41	1.310	33,2	1.285 ÷ 1.400	32,6 ÷ 35,5	MG-1296	MR-37-A	MM-71	
	14	0.083	2,11	1.334	33,9						
	15	0.072	1,82	1.356	34,4	1.331 ÷ 1.446	33,8 ÷ 36,7	MG-1298	MR-38-A		
	16	0.065	1,65	1.370	34,8						
	17	0.058	1,47	1.384	35,1						
	18	0.049	1,24	1.402	35,6	1.331 ÷ 1.472	33,8 ÷ 37,3	MG-1300	MR-38-A	MM-72	
	19	0.042	1,06	1.416	35,9						
20	0.035	0,88	1.430	36,3							

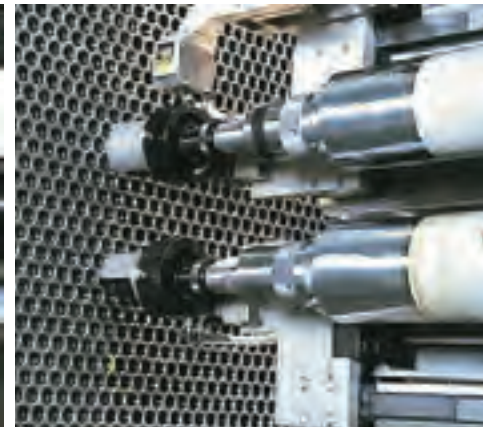
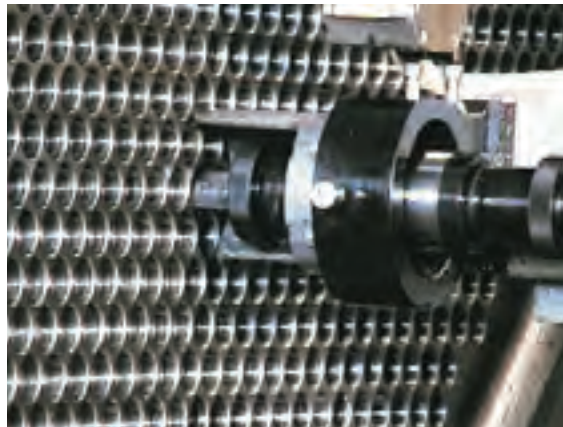
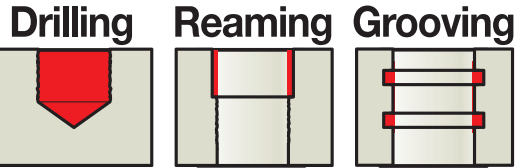
Other workings

(see relative catalogues)



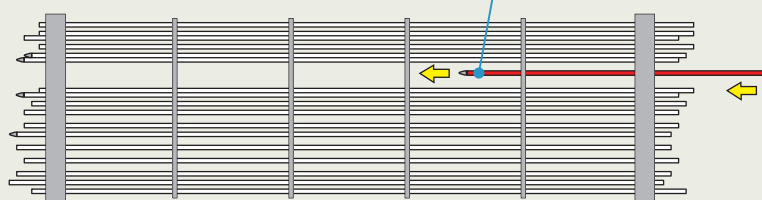
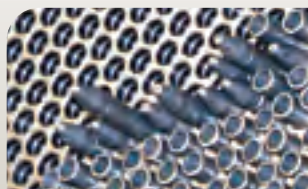
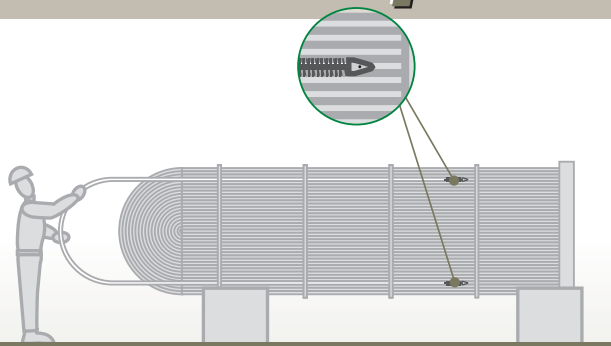
Holetool

Automatic equipments and tools (with cooling holes) for tube sheet refurbishment.



Tubepilot

Tube pilot for tube bundle assembling

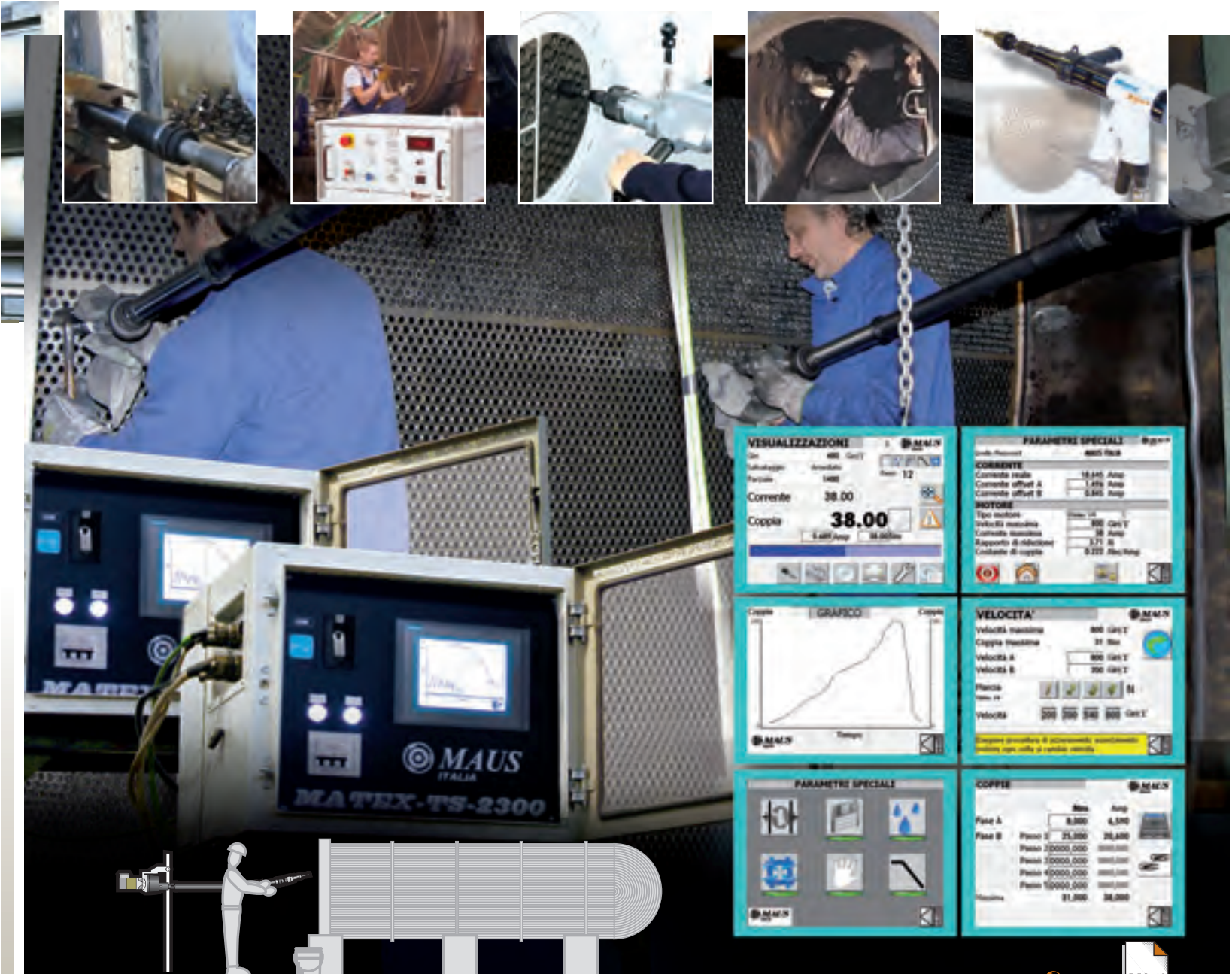


Tube expanders

A complete range of tube expanders

Tuberoll

Semiautomatic and automatic electric or pneumatic tube rolling



VISUALIZZAZIONE Velocità: 800 Gm/T Parametro: 12 Corrente: 38.00 Coppia: 38.00 8.441 Amp / 38.00 Nm	PARAMETRI SPECIALI Corrente reale: 10.440 Amp Corrente offset A: 1.476 Amp Corrente offset B: 2.842 Amp INFORME Tipo motore: 300 Gm/T Velocità massima: 800 Gm/T Controllo sensore: 38 Amp Rapporto di riduzione: 3.71 A Costante di coppia: 9.222 Nm/Hz
GRAFICO Coppia vs Tempo (Line graph showing torque over time)	VELOCITÀ Velocità massima: 800 Gm/T Coppia massima: 37 Nm Velocità A: 800 Gm/T Velocità B: 300 Gm/T Pancia: 11 Velocità: 000 000 000 000 Gm/T Sempre graficare il percorso, altrimenti non viene utile il cambio canale
PARAMETRI SPECIALI (Icons for various functions)	COFFEE Fase A: 8.500 / 4.500 Amp Fase B: Presso 2 25.000 26.000 / 20000.000 20000.000 / Presso 4 20000.000 20000.000 / Presso 5 40000.000 20000.000 / Presso 100000.000 20000.000 Maxima: 81.000 38.000

Other workings

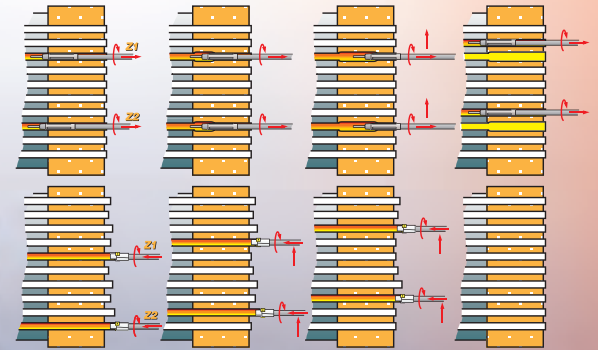
(see relative catalogues)



MA-500

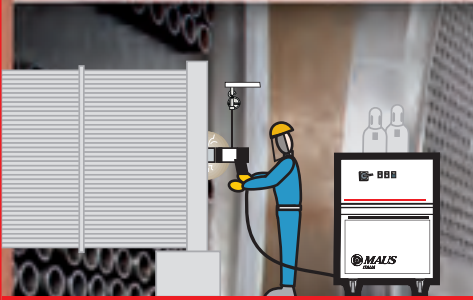
MA-2501

Automatic rolling, facing and welding
double-axis centre



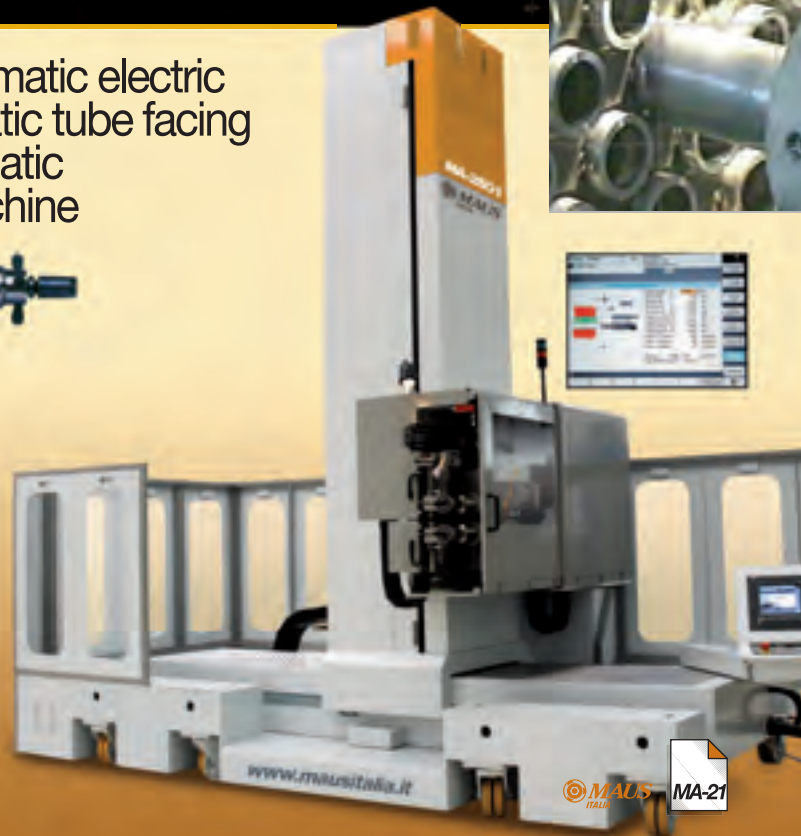
Tubweld

Semi-automatic and automatic systems for tube-to-tubesheet TIG orbital welding



Tubend

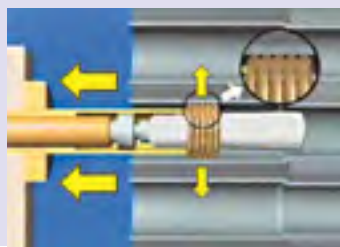
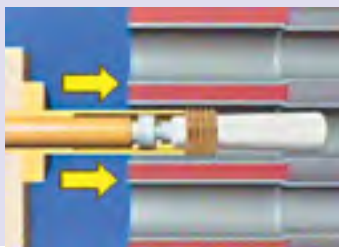
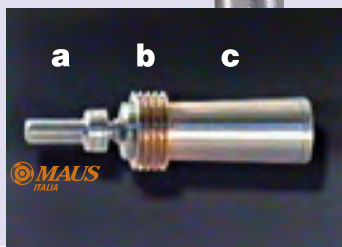
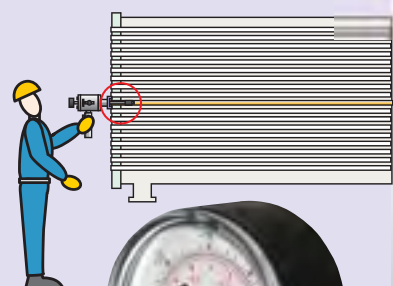
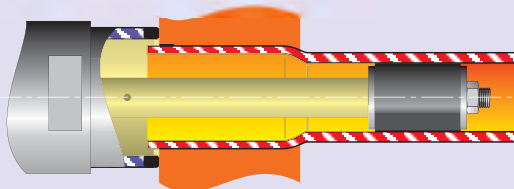
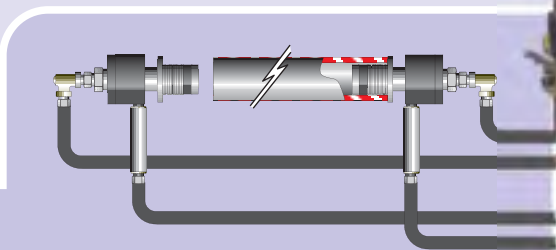
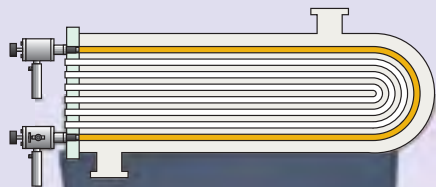
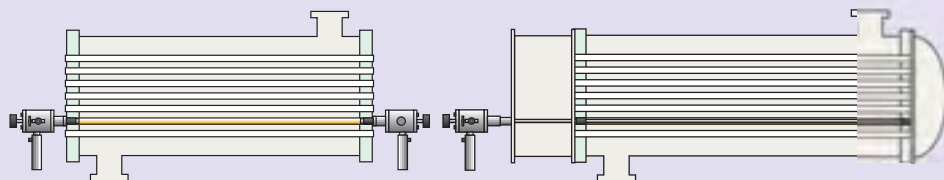
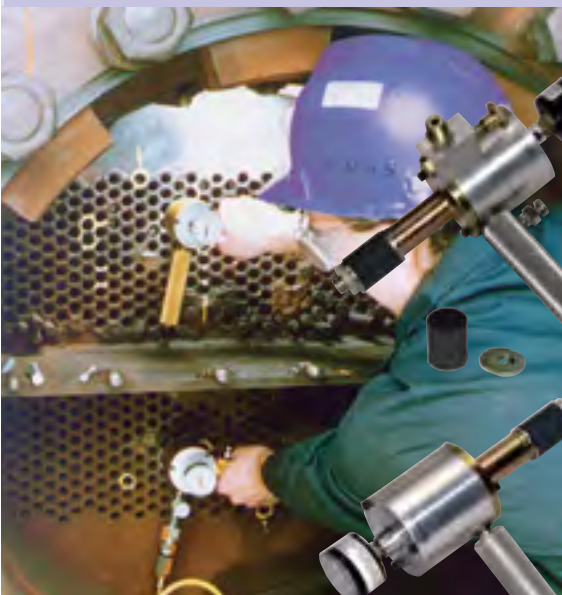
Semi-automatic electric or pneumatic tube facing and automatic facing machine



Other works (see relative catalogues)

Tube testing and plugging

Pneumatic pressure testing (Guns), hydrostatic pressure testing (Pump), plug and Pop a Plug.

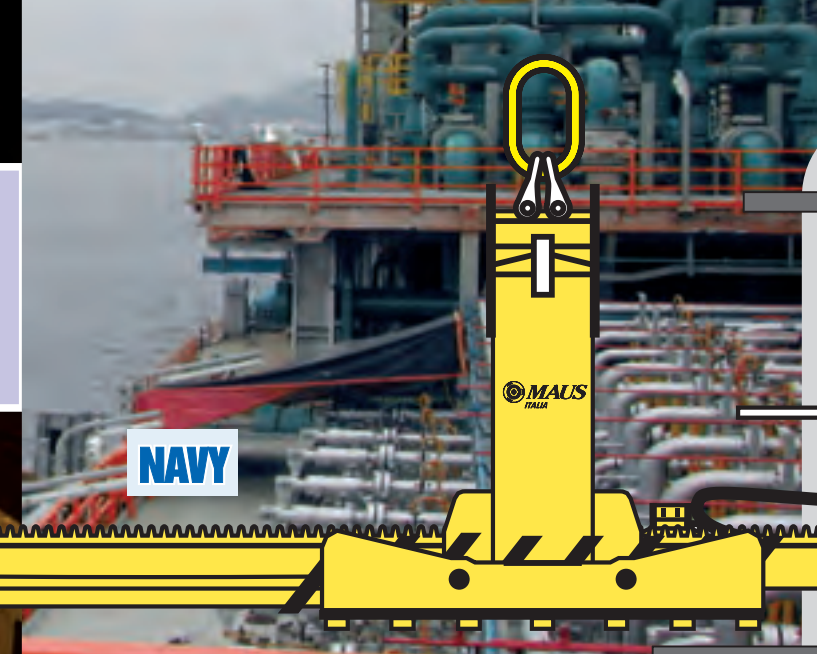
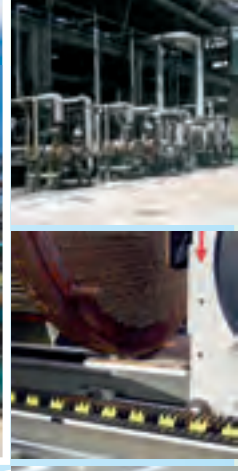
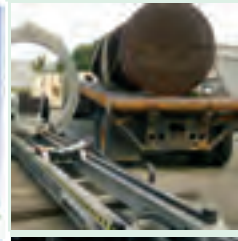
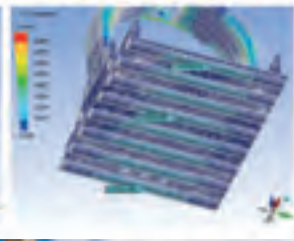
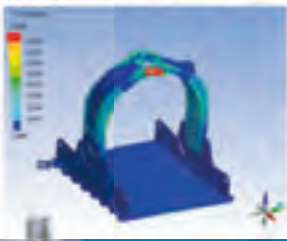
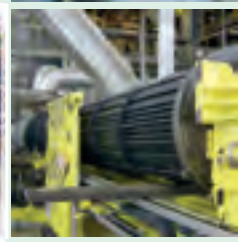
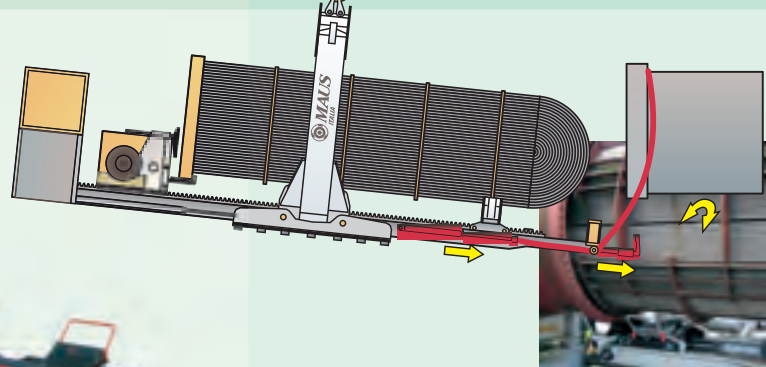


MG-22

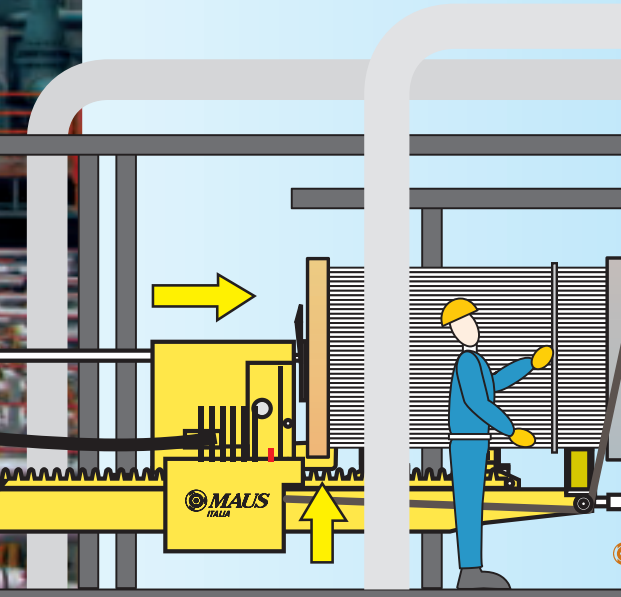
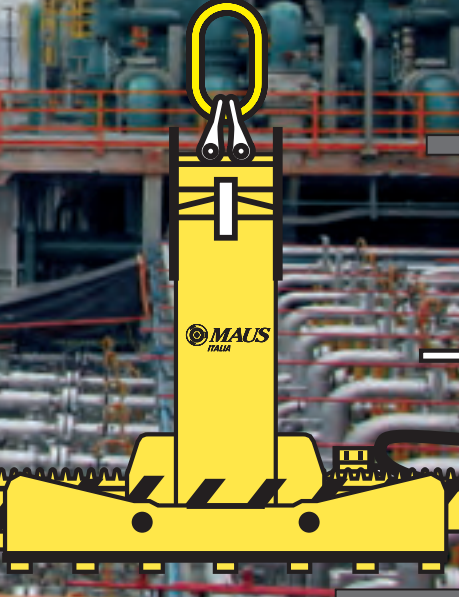
MAUS
ITALIA

Tube bundle extraction...

Aerial tube bundle pulles available for on-shore and off-shore operation.



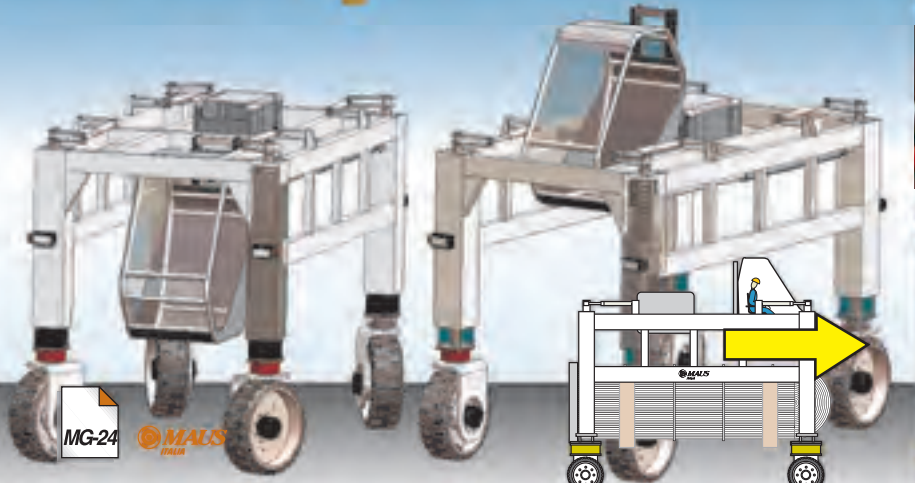
NAVY



Other works (see relative catalogues)

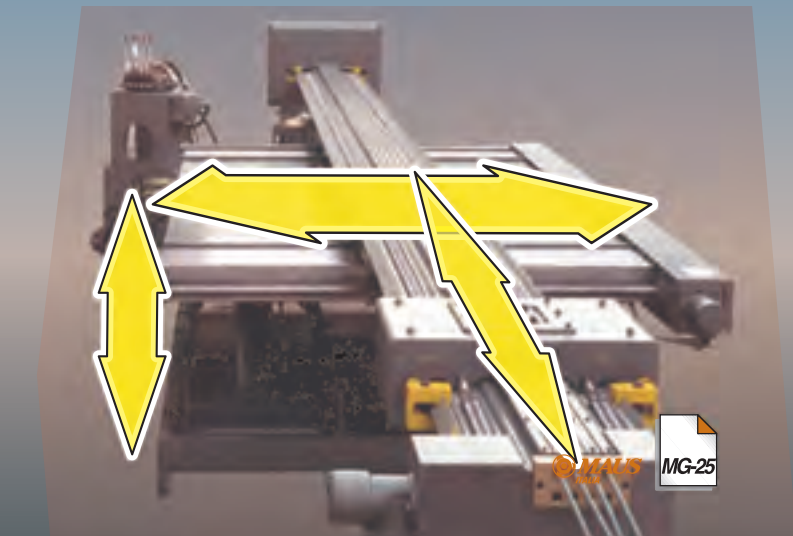
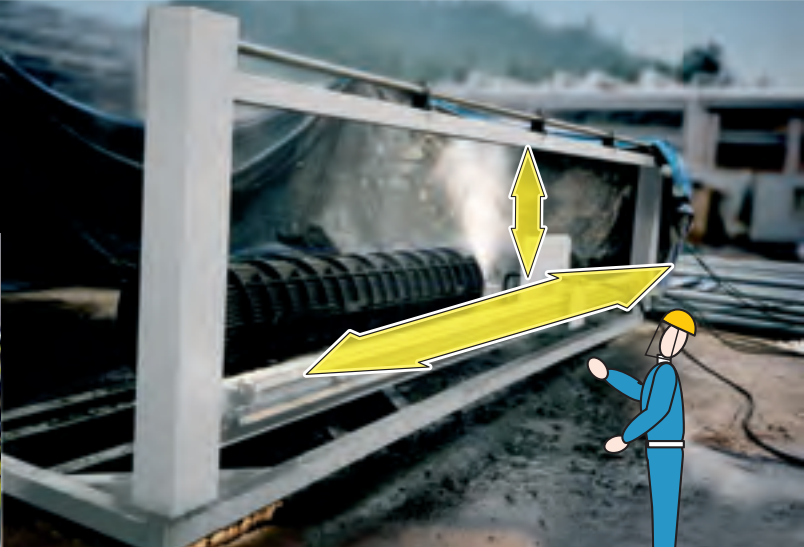
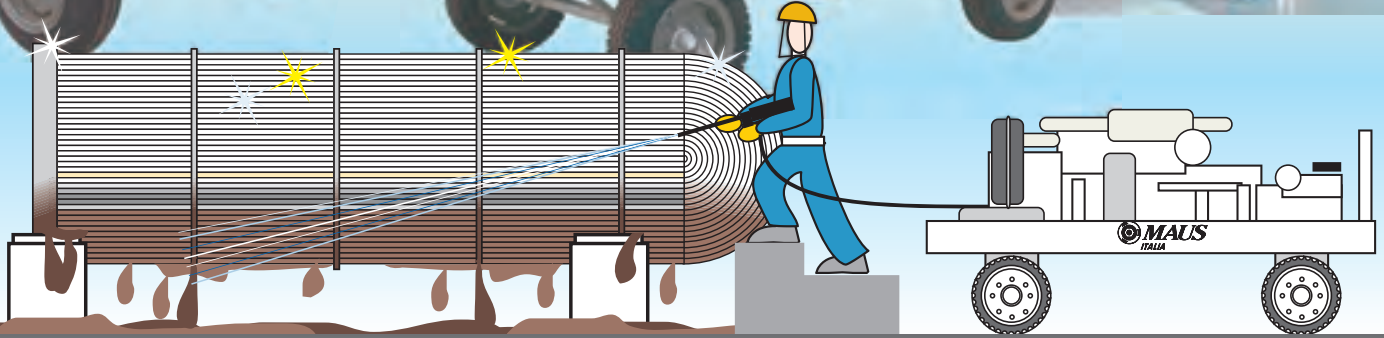
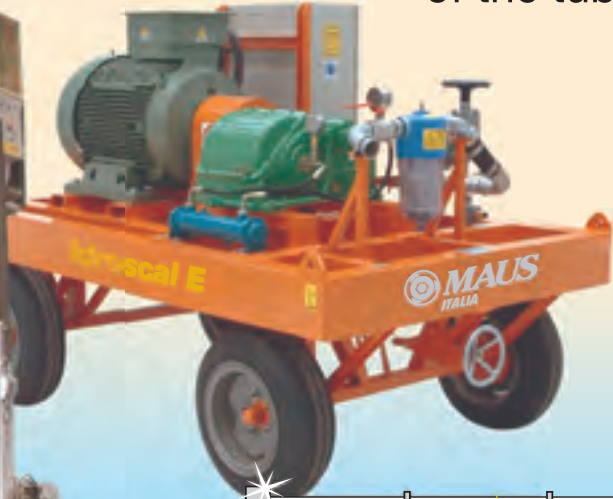
... and transporting

Self-propelled tube bundle pullers available for on-shore and off-shore operation and truck bundle pullers and transporter.



Tube bundle cleaning

Complete range of machines for automatic internal and external cleaning of the tubes in the tube bundles



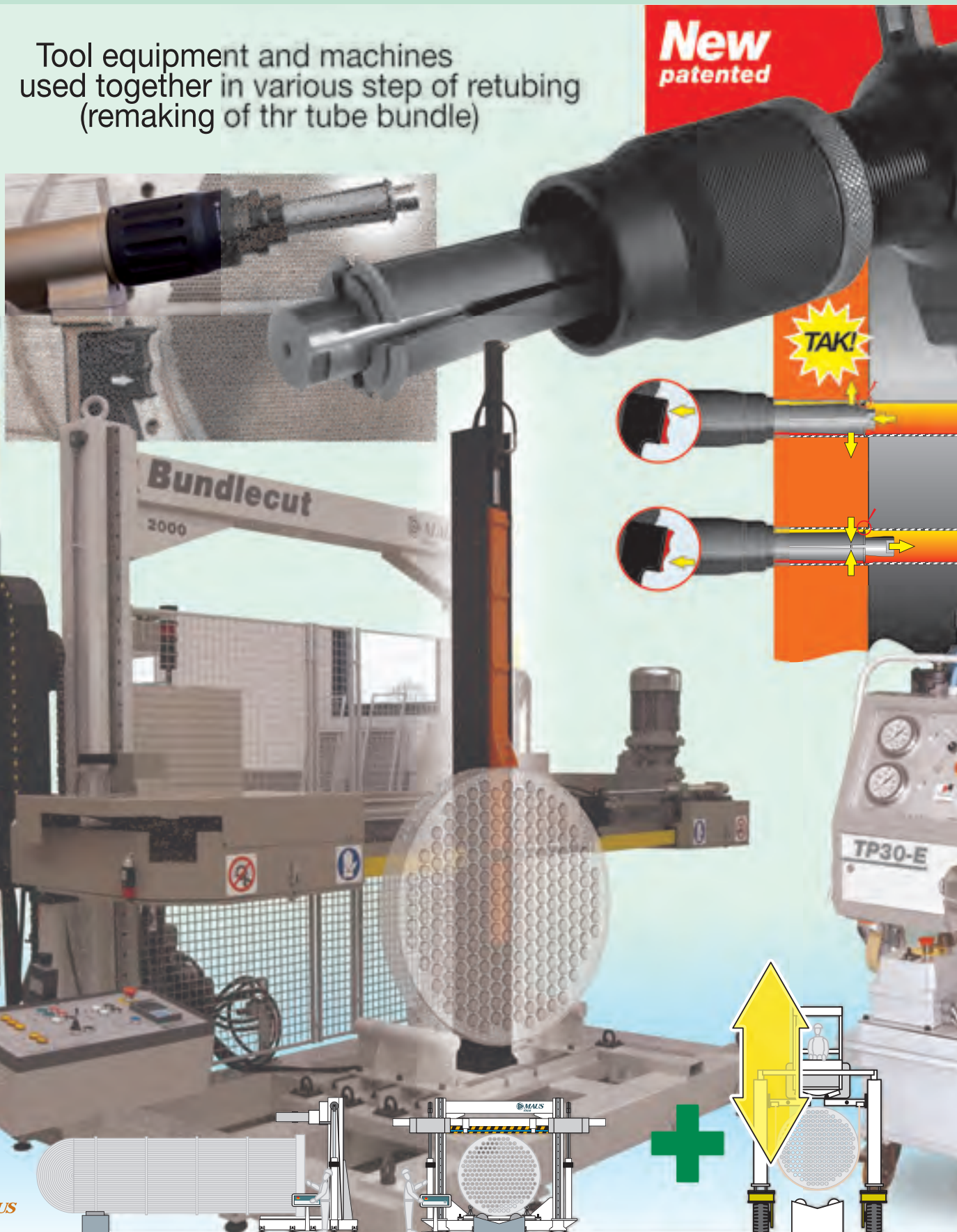
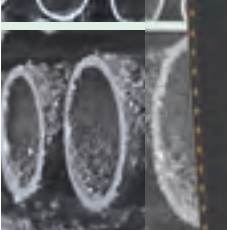
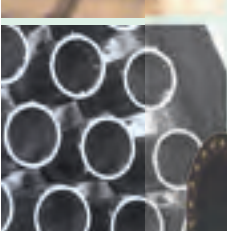
Other works (see relative catalogues)

Retubing

Tool equipment and machines used together in various step of retubing (remaking of thr tube bundle)

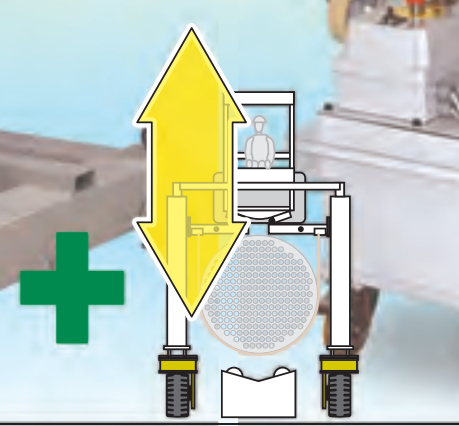
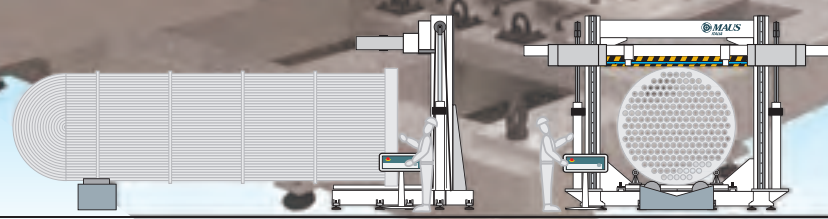
New
patented

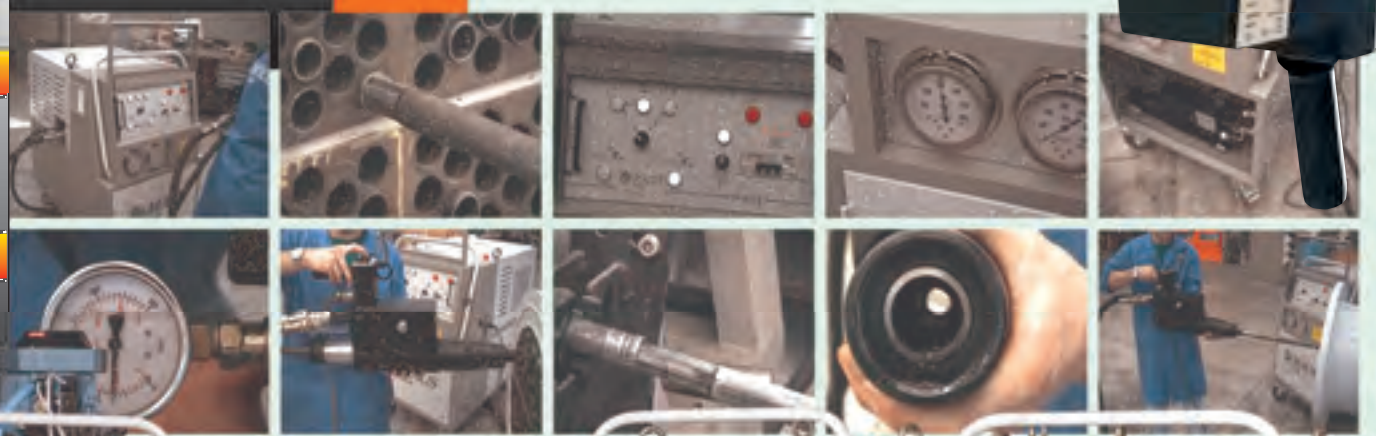
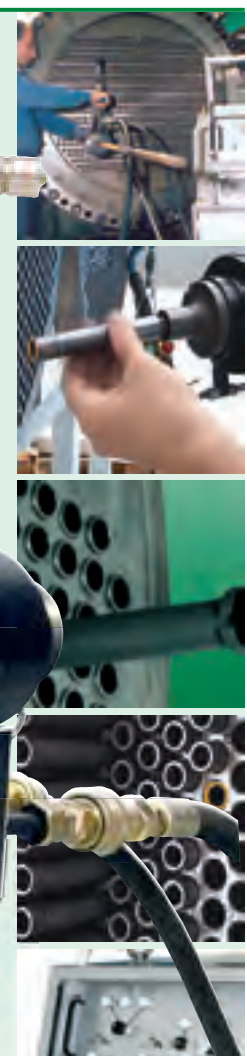
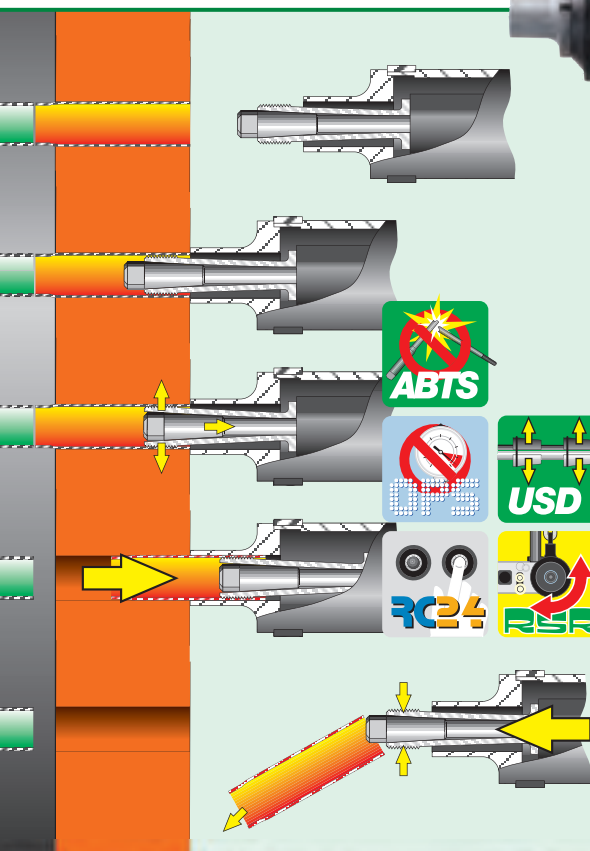
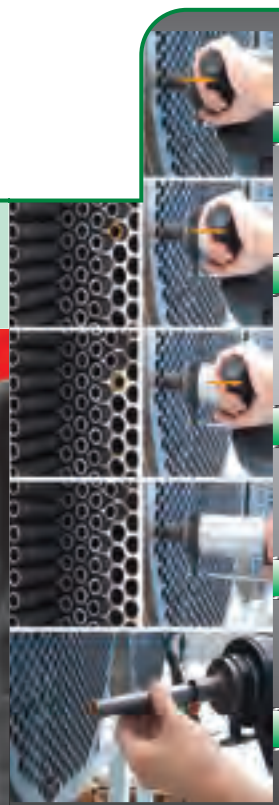
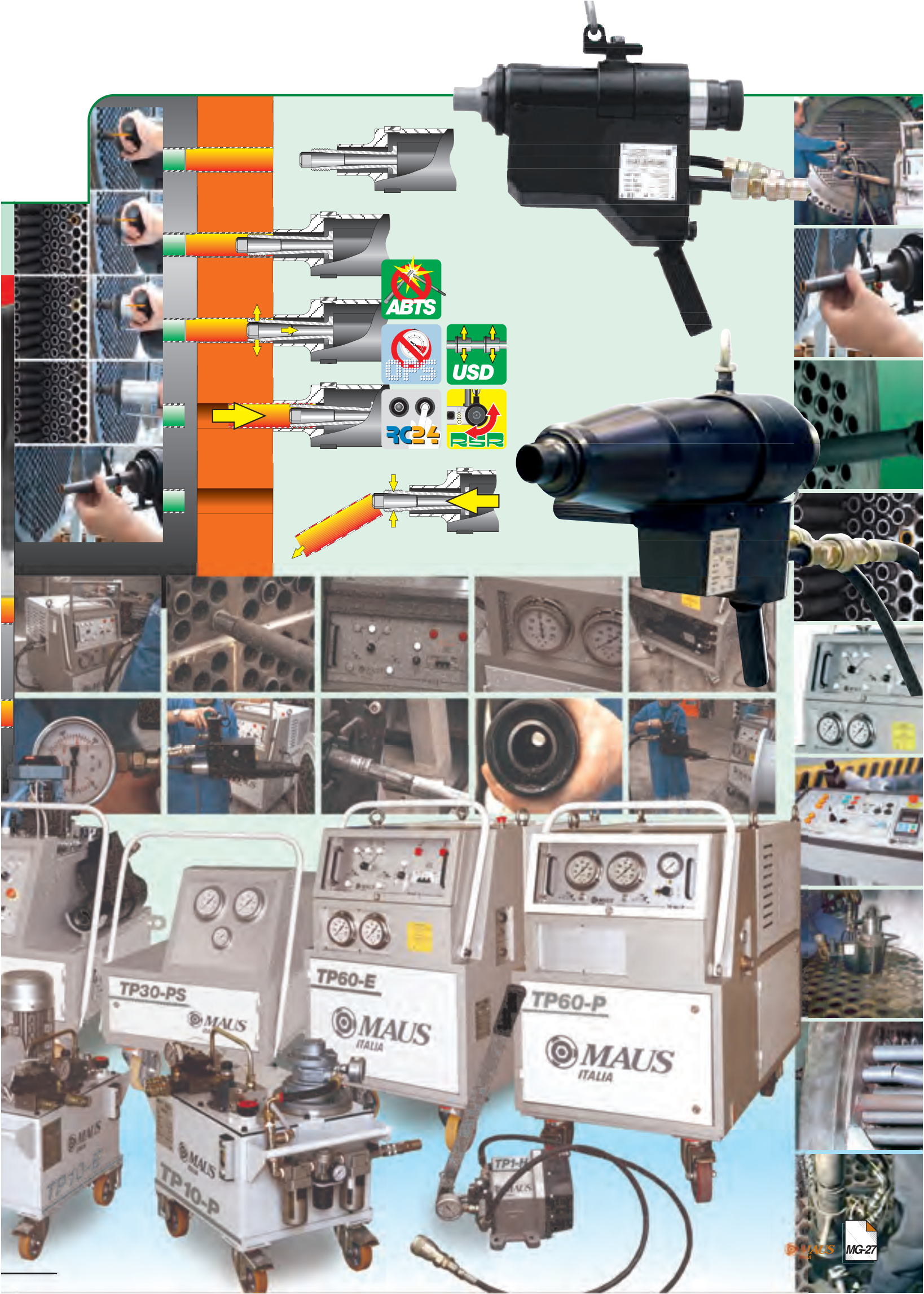
TAK!



MG-26

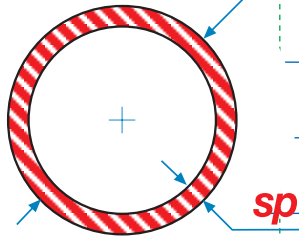
MAUS
ITALIA





BWG Birmingham Wire Gauge

de “ mm	00 BWG		0 BWG		1 BWG		2 BWG		3 BWG		4 BWG		5 BWG		6 BWG		7 BWG		8 BWG		9 BWG		10 BWG		11 BWG							
	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm	“	mm				
sp →	0.380	9,65	0.340	8,64	0.300	7,62	0.284	7,21	0.259	6,58	0.238	6,05	0.220	5,59	0.203	5,16	0.180	4,57	0.165	4,19	0.148	3,76	0.134	3,40	0.120	3,05						
1/4" (6,3)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3/8" (9,5)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
1/2" (12,7)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
5/8" (15,9)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
3/4" (19,0)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.482	12,2	0.510	12,9	-	-	-	-		
7/8" (22,2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.607	15,4	0.635	16,1	-	-	-	-		
1" (25,4)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.670	17,0	0.704	17,9	0.732	18,6	0.760	19,3	-	-	-	-	-	-		
1.1/4" (31,8)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.890	22,6	0.920	23,4	0.954	24,3	0.982	25,0	1.010	25,7	-	-	-	-	-	-		
1.1/2" (38,1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.140	28,9	1.170	29,7	1.204	30,6	1.232	31,3	1.260	32,0	-	-	-	-	-	-		
1.3/4" (44,4)	-	-	-	-	-	-	-	-	-	-	1.310	33,2	1.344	34,1	1.390	35,2	1.420	36,0	1.454	36,9	1.482	37,6	1.510	38,3	-	-	-	-	-	-		
2" (50,8)	-	-	-	-	-	-	-	-	1.524	38,7	1.560	39,6	1.594	40,5	1.640	41,6	1.670	42,4	1.704	43,3	1.732	44,0	1.760	44,7	-	-	-	-	-	-		
2.1/4" (57,1)	1.490	37,8	1.570	39,8	1.650	41,8	1.682	42,7	1.732	43,9	1.774	45,0	1.810	45,9	1.844	46,8	1.890	47,9	1.920	48,7	1.954	49,6	1.982	50,3	2.010	51,0	-	-	-	-	-	-
2.1/2" (63,5)	1.740	44,2	1.820	46,2	1.900	48,2	1.932	49,1	1.982	50,3	2.024	51,4	2.060	52,3	2.094	53,2	2.140	54,3	2.170	55,1	2.204	56,0	2.232	56,7	2.260	57,4	-	-	-	-	-	-
2.3/4" (69,8)	1.990	50,5	2.070	52,5	2.150	54,5	2.182	55,3	2.232	56,6	2.274	57,7	2.310	58,6	2.344	59,5	2.390	60,6	2.420	61,4	2.454	62,3	2.482	63,0	2.510	63,7	-	-	-	-	-	-
3" (76,2)	2.240	56,9	2.320	58,9	2.400	60,9	2.432	61,8	2.482	63,0	2.524	64,1	2.560	65,0	2.594	65,9	2.640	67,0	2.670	67,8	2.704	68,7	2.732	69,4	2.760	70,1	-	-	-	-	-	-
3.1/4" (82,6)	2.490	63,3	2.570	65,3	2.650	67,3	2.682	68,2	2.732	69,4	2.774	70,5	2.810	71,4	2.844	72,3	2.890	73,4	2.920	74,2	2.954	75,1	2.982	75,8	3.010	76,5	-	-	-	-	-	-
3.1/2" (88,9)	2.740	69,6	2.820	71,6	2.900	73,6	2.932	74,5	2.982	75,7	3.024	76,8	3.060	77,7	3.094	78,6	3.140	79,7	3.170	80,5	3.204	81,4	3.232	82,1	3.260	82,8	-	-	-	-	-	-
3.3/4" (95,2)	2.990	75,9	3.070	77,9	3.150	79,9	3.182	80,8	3.232	82,0	3.274	83,1	3.310	84,0	3.344	84,9	3.390	86,0	3.420	86,8	3.454	87,7	3.482	88,4	3.510	89,1	-	-	-	-	-	-
4" (101,6)	3.240	82,3	3.320	84,3	3.400	86,3	3.432	87,2	3.482	88,4	3.524	89,5	3.560	90,4	3.594	91,3	3.640	92,4	3.670	93,2	3.704	94,1	3.732	94,8	3.760	95,5	-	-	-	-	-	-
4.1/4" (108,0)	3.490	88,7	3.570	90,7	3.650	92,7	3.682	93,6	3.732	94,8	3.774	95,9	3.810	96,8	3.844	97,7	3.890	98,8	3.920	99,6	3.954	100,5	3.982	101,2	4.010	101,9	-	-	-	-	-	-
4.1/2" (114,3)	3.740	95,0	3.820	97,0	3.900	99,0	3.932	99,9	3.982	101,1	4.024	102,2	4.060	103,1	4.094	104,0	4.140	105,1	4.170	105,9	4.204	106,8	4.232	107,5	4.260	108,2	-	-	-	-	-	-



GSA-5

Special water soluble grease for rolling



12 BWG		13 BWG		14 BWG		15 BWG		16 BWG		17 BWG		18 BWG		19 BWG		20 BWG		21 BWG		22 BWG		23 BWG		24 BWG		de " mm		
"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	"	mm	← sp
0.109	2,77	0.095	2,41	0.083	2,11	0.072	1,83	0.065	1,65	0.058	1,47	0.049	1,24	0.042	1,07	0.035	0,89	0.032	0,81	0.028	0,71	0.025	0,64	0.022	0,56	-	-	1/4" (6,3)
-	-	-	-	-	-	-	-	-	-	-	-	0.152	3,8	0.166	4,1	0.180	4,5	0.186	4,7	0.194	4,9	0.200	5,0	0.206	5,2	-	-	3/8" (9,5)
-	-	0.310	7,9	0.334	8,5	0.356	9,0	0.370	9,4	0.384	9,7	0.402	10,2	0.416	10,5	0.430	10,9	0.436	11,1	0.444	11,3	0.450	11,4	0.456	11,6	-	-	1/2" (12,7)
0.407	10,3	0.435	11,1	0.459	11,7	0.481	12,2	0.495	12,6	0.509	12,9	0.527	13,4	0.541	13,7	0.555	14,1	0.561	14,3	0.569	14,5	0.575	14,6	0.581	14,8	-	-	5/8" (15,9)
0.532	13,4	0.560	14,2	0.584	14,8	0.606	15,3	0.620	15,7	0.634	16,0	0.652	16,5	0.666	16,8	0.680	17,2	0.686	17,4	0.694	17,6	0.700	17,7	0.706	17,9	-	-	3/4" (19,0)
0.657	16,6	0.685	17,4	0.709	18,0	0.731	18,5	0.745	18,9	0.759	19,2	0.777	19,7	0.791	20,0	0.805	20,4	0.811	20,6	0.819	20,8	0.825	20,9	0.831	21,1	-	-	7/8" (22,2)
0.782	19,8	0.810	20,6	0.834	21,2	0.856	21,7	0.870	22,1	0.884	22,4	0.902	22,9	0.916	23,2	0.930	23,6	0.936	23,8	0.944	24,0	0.950	24,1	0.956	24,3	-	-	1" (25,4)
1.032	26,2	1.060	27,0	1.084	27,6	1.106	28,1	1.120	28,5	1.134	28,8	1.152	29,3	1.166	29,6	1.180	30,0	1.186	30,2	1.194	30,4	1.200	30,5	1.206	30,7	-	-	1 1/4" (31,8)
1.282	32,5	1.310	33,3	1.334	33,9	1.356	34,4	1.370	34,8	1.384	35,1	1.402	35,6	1.416	35,9	1.430	36,3	1.436	36,5	1.444	36,7	1.450	36,8	1.456	37,0	-	-	1 1/2" (38,1)
1.532	38,8	1.560	39,6	1.584	40,2	1.606	40,7	1.620	41,1	1.634	41,4	1.652	41,9	1.666	42,2	1.680	42,6	1.686	42,8	1.694	43,0	1.700	43,1	1.706	43,3	-	-	1 3/4" (44,4)
1.782	45,2	1.810	46,0	1.834	46,6	1.856	47,1	1.870	47,5	1.884	47,8	1.902	48,3	1.916	48,6	1.930	49,0	1.936	49,2	1.944	49,4	1.950	49,5	1.956	49,7	-	-	2" (50,8)
2.032	51,5	2.060	52,3	2.084	52,9	2.106	53,4	2.120	53,8	2.134	54,1	2.152	54,6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 1/4" (57,1)
2.282	57,9	2.310	58,7	2.334	59,3	2.356	59,8	2.370	60,2	2.384	60,5	2.402	61,0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 1/2" (63,5)
2.532	64,2	2.560	65,0	2.584	65,6	2.606	66,1	2.620	66,5	2.634	66,8	2.652	67,3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2 3/4" (69,8)
2.782	70,6	2.810	71,4	2.834	72,0	2.856	72,5	2.870	72,9	2.884	73,2	2.902	73,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3" (76,2)
3.032	77,0	3.060	77,8	3.084	78,4	3.106	78,9	3.120	79,3	3.134	79,6	3.152	80,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3 1/4" (82,6)
3.282	83,3	3.310	84,1	3.334	84,7	3.356	85,2	3.370	85,6	3.384	85,9	3.402	86,4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3 1/2" (88,9)
3.532	89,6	3.560	90,4	3.584	91,0	3.606	91,5	3.620	91,9	3.634	92,2	3.652	92,7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3 3/4" (95,2)
3.782	96,0	3.810	96,8	3.834	97,4	3.856	97,9	3.870	98,3	3.884	98,6	3.902	99,1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4" (101,6)
4.032	102,4	4.060	103,2	4.084	103,8	4.106	104,3	4.120	104,7	4.134	105,0	4.152	105,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4 1/4" (108,0)
4.282	108,7	4.310	109,5	4.334	110,1	4.356	110,6	4.370	111,0	4.384	111,3	4.402	111,8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4 1/2" (114,3)



MAUS ITALIA F. AGOSTINO & C. s.a.s.
SS PAULLESE KM 30
26010 BAGNOLO CREMASCO (CR)

Tel. +39 0373 2370
FAX +39 0373 237039
e-mail: expo@mausitalia.it
www.mausitalia.it