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The intended target groups of this document are:

Customer, Service Partner, Commissioning Partner, Subsidiaries/Branches, Location Jenbach

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1 Technical instructions

Technical Instructions partly belong to the contract and are partly supplied together with the installation. However, these are always included with the Description – Operating manual in the relevant language or ordered. The Description – Operating Manual is customer specific and will be supplied at the latest during the commissioning of the installation. Should you require specific Technical Instructions in advance, please contact your GE Jenbacher GE Jenbachercontact person.

1.1 Basic conditions

Boundary conditions for GE Jenbacher gas engines	1100-0110
General conditions - Operation and maintenance	1100-0111
Installation of GE Jenbacher Units	1100-0112
Requirements for the module installation site	1000-0041
Lifting, transporting and placing GE Jenbacher generating sets in the engine room	1000-0042
Transporting and setting up GE Jenbacher control cabinets	1000-0043
Lifting, transporting and placing GE Jenbacher generating sets in the engine room	1000-0046
Special Container (3m) – Lifting and handling (Container with sunk lifting lugs)	1000-0047
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Lifting of GE Jenbacher type J 312/316/320 GS engines	1000-0062
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Lifting Jenbacher Type 1 ISO Container (Containers with top container corners at both container ends)	1000-0065
Employee protection	2300-0001
Safety instructions	2300-0005

1.2 Mechanical engine and system components

Transit support	1000-0044
Pipework	1400-0131

1.3 Electrical engine and system components

EMC approved routing of wiring and earth connections to/between engine modules and control cabinets	1000-0505
Handling of electronic components/assemblies	1000-0510
Protective measures for installing high-voltage circuits	1000-0515
Isolated operation of spark ignition gas engines with dia.ne (type 3 engines)	2108-0025
Isolated operation of spark-ignition gas engines with dia.ne (Type 6-E engines)	2108-0026
Isolated operation J208 with SAM version 2.xx	2108-0027
Isolated operation of spark ignition gas engines with dia.ne (type 4 engines)	2108-0029
J208 in isolated operation with DianeXT	2108-0030
Isolated operation - general	2108-0031

1.4 Operation



Switching off the engine	1100-0105
Regulations for running in GE generating set engines	1400-0100

1.5 Engine oil / engine lubricating oil

Lubricating oil for GE Jenbacher engines	1000-1109
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1.6 Cooling Water

Quality of cooling water in closed circuits	1000-0200
Anti-freeze agent	1000-0201
Cooling water anti-corrosion additive	1000-0204
Quality of circuit water in hot water and warm water heating systems	1000-0206

1.7 Fuel gas

Fuel-gas quality of natural, associated petroleum, biogas and landfill gas	1000-0300
Fuel-gas quality of mine gas	1000-0301
Fuel-gas quality of special gas	1000-0302
Freedom from condensate of fuel gases for GE Jenbacher gas engines	1400-0091

2 Technical data - Facility

2.1 Power and degrees of efficiency

Q_{zu}/Q_m	Energy supplied/mechanical		kWh/kWh
p_{me}	Effective mean pressure		bar
P_m	Mechanical power Blocked ISO standard power ICFN according to ISO 3046		kW
P_{el}	Electric power output at $\cos \phi = 1$		kW
η_{el}	Electrical efficiency		%
η_{therm}	Therm. efficiency		%
η_{ges}	Total efficiency		%

2.2 Standard reference conditions

Air pressure	mbar	1000*)
Air temperature	°C	25
Relative humidity	%	30

*) or 100 m above mean sea level

2.3 Exhaust system

M_{of}	Exhaust gas volume moist		kg/h
L_p	Residual sound pressure level when operating a module		dB (A) at 10m distance



NO_x	Nitrogen oxides	mg/Nm ³ ²⁾	
CO	Carbon monoxide	mg/Nm ³ ²⁾	
NMHC¹⁾	Non-methane hydrocarbons	mg/Nm ³ ²⁾	

¹⁾ At a total installation emission of > 3 kg/h.

The exhaust gas emission values refer to dry exhaust gas with 5% O₂, in standard reference conditions, during which the gas engine should, at the very least, be operated at half load.

²⁾ Exhaust gas emission values expressed in mg/m³ for dry exhaust gas, in standard reference conditions, with 5% O₂.

2.4 Fuel gas system

Mz	methane number		
Hu	Calorific value	kWh/Nm ³	
V_{gas}	Fuel gas volume		Nm ³ /h

2.5 Water circuit

V_{ww}	Cooling Water		m ³ /h
V_{gk}	Mixture cooling water		m ³ /h

2.6 Intake air

V_i	intake air volume		Nm ³ /h
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2.7 Energy balances

		Ambient temperature		°C	°C
Q_{ag}	Heat exchanger exhaust gas / water	°C		kWh	
Q_{gk1}	Heat exchanger mixture / water (stage 1)			kWh	
Q_{gk2}	Heat exchanger mixture / water (stage 2)			kWh	
Q_{getr}	Gearbox			kWh	
Q_{kW}	Heat exchanger engine cooling water / water			kWh	
Q_{oil}	Heat exchanger engine oil / water			kWh	
Q_{re}	Residual heat			kWh	
Q_{st}	Radiation heat (engine and generator)			kWh	
Q_{ww}	Total usable thermal output			kWh	

2.8 Temperatures

Hot water return temperature (technical diagram A)	+	°C
	-	
Hot water inlet temperature (technical diagram B)	+	°C
	-	



Inlet temperature (heat exchanger mixture / water, stage 2) (Technical diagram M)	+	°C	
	-		
Outlet temperature (heat exchanger mixture / water, stage 2) (Technical diagram N)	+	°C	
	-		

2.9 Weight

$M_{ges\ tr}$	Total engine weight (dry) (Module Container)	kg	
$M_{ges\ gf}$	Total engine weight (filled) (Module Container)	kg	
$M_{Mot\ tr}$	Engine weight dry	kg	
$M_{Mot\ gf}$	Engine weight filled	kg	
M_{Aggr}	Module weight ¹⁾	kg	
$M_{Gen + Getr}$	Weight of generator and transmission	kg	
M_{Gen}	Generator weight	kg	

¹⁾ In type 6 engines (version E), the generator is mounted on a separate frame. Its weight is therefore not included in this value.

2.10 Dimensions

Length	mm	
Width	mm	
Height	mm	

2.11 Lacquer coat

L_{Mot}	Engine	RAL No.	
L_{Gen}	Generator	RAL No.	
L_{Fra}	Frame	RAL No.	
L_{Con}	Container	RAL No.	
L_{Sch}	Switch cabinet	RAL No.	



The operating materials and system peripherals must conform to TI 1100-0110 "Requirements for GE Jenbacher Gas Engines".

3 Key to module drawings and technical diagram

3.1 Connections








Different letters are used to identify different media (e.g. **D** = fuel gas entry). In some cases, a digit is added to the letter to give even more detailed information.

The same systematics are used in the technical diagram to indicate any media entering or exiting.



Fuel gas:	D →	Fuel gas entry
	T →	Fuel gas entering (pre-combustion chamber gas supply line)
Intake air:	V →	Intake air
Water:	A →	Hot water input
	B →	Hot water output
	E →	Discharge
	F →	Condensation drain
	G →	Safety valve (engine cooling water circuit or mixture cooling water circuit)
	H →	Safety valve (hot water circuit)
	L →	Filling connection (engine cooling water circuit or mixture cooling water circuit)
	M →	Water entering (mixture/water heat exchanger stage 2)
	N →	Water exiting (mixture/water heat exchanger stage 2)
	P →	water entering (fuel gas preheating)
	Q →	water exiting (fuel gas preheating)
	R →	Raw water input
	S →	Raw water output
	W →	Engine cooling water, engine cooling water entering
	W₁ →	Engine cooling water exiting
W₂ →	Water entering (mixture/water heat exchanger stage 1)	
W₃ →	Water exiting (mixture/water heat exchanger stage 1)	
Engine oil :	I →	Engine oil refill (connection to fresh oil tank)











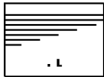
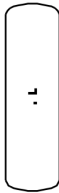



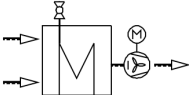

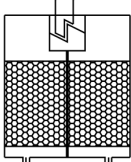
		Engine oil drain (connection to used oil tank)
		Engine oil exiting (to engine oil/water heat exchanger)
		Engine oil entering (from engine oil/water heat exchanger)
Exhaust gas:		Exhaust gas outlet
		Exhaust gas inlet

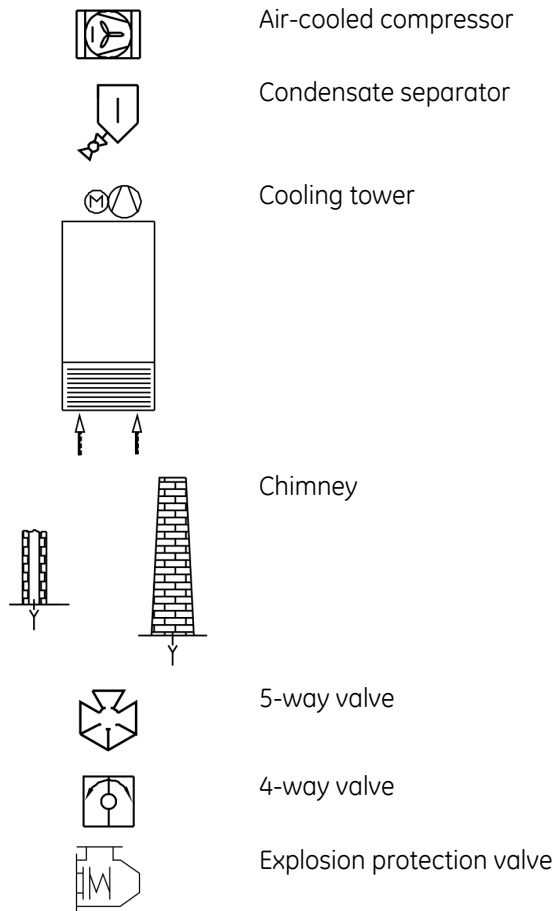
3.2 Key to lines and components

The following list contains a selection of the symbols used in the technical diagram. In addition, the symbolic representations are accordance with DIN 2481 and DIN 19227-1 apply.

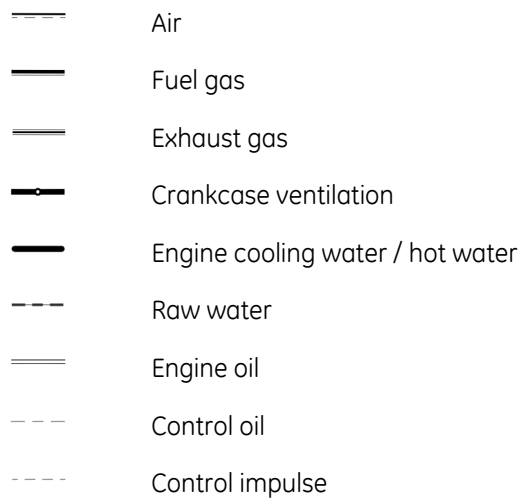
3.2.1 Key to components



	placed on the module
	placed in the switch cabinet
	Non-return valve
	Ball valve
	Compensator
	3-way valve
	JENBACHER Interface GE Jenbacher limit of supply, and/or GE Jenbacher scope of supply
	Pressure expansion vessel
	Oil reservoir
	Pressure vessel, gas
	Piston
	Catalytic converter
	Codibox
	Single-circuit table cooler
	Dual-circuit table cooler
	Thermal reactor



3.2.2 Key to lines



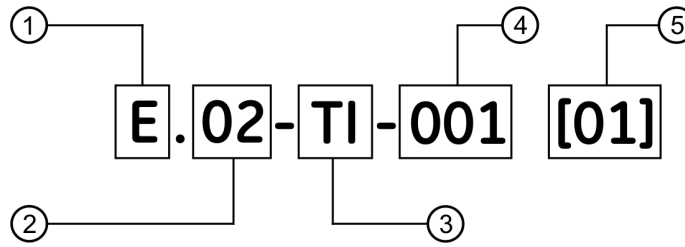
3.3 GE Jenbacher - Tag number



The GE Jenbacher tag numbers are based on a logical combination of alphanumeric blocks. This number provides general information on the component's position and function. More detailed information can be found in the technical diagram and circuit diagram.



The GE Jenbacher tag number consists of 5 such blocks.



①	System	④	Number
②	Circuit	⑤	Part
③	Type		

3.3.1 System

Letters	Description
E	Engine
M	Module
O	ORC
P	System
G	Generator

3.3.2 Circuit

Letters	Description
00	Engine block
01	Fuel gas
02	Exhaust gas
03	Lubricating oil
04	Cooling water
05	Air
06	High temperature circuit
07	Low temperature circuit
08	Air/Fuel-gas mixture
09	Emergency cooling
10	Customised
11	Thermo oil
12	ORC high-temperature circuit
13	ORC low-temperature circuit
14	Pre-combustion chamber gas system
15	Nitrogen purging installation
16	Thermal reactor
17	Ventilation system
18	Transmission+accessories
19	Activated carbon



Letters	Description
20	TSA
21	Water (external source)
22	Generator rotor
23	Generator stator
24	Chemicals
25	Steam
26	Waste water
27	Cooling tower circuit

3.3.3 Type

Letters	Description
A	Generator
AI	Vibration sensor
B	Container
DS	Steam boiler
DV	Consumer (customer)
EI	Ignition Control
F	Filter
FC	Frequency converter
FI	Flow indicator
FL	Flow limiter
FQ	Flow meter
FS	Flow switch
GL	Inspection glass
JI	Analysis equipment
KH	Ball valve
KHF	Ball valve with spring return
LI	Level sensor
LS	Level switch
M	Engine
NS	Engine On/Off
NC	Engine frequency controlled
P	Pump
PDS	Differential-pressure switch
PI	Pressure control
PID	Differential pressure sensor
PS	Pressure switch
QC	Volumeter
QQ	Calorimeter
S	Switch
SI	Pickup
TC	Temperature control
TI	Temperature control
TS	Temperature switch



Letters	Description
US	Leak testing
USZ	Ignition
VB	Fan
VT	Compressor
W	Heat exchanger
XCO	Compensator
XFH	Hose
XSA	Silencer
Y	Driving motor (piston machine)
YCI	Valve with position controller
YCS	Valve Open/Closed
Y CZ	Valve Open/Closed safety relevant
YFA	Flame disruption protection
YFC	Bundle control valve/Shut-off valve
YPC	Filling valve
YPS	Safety valve
YRC	Non-return valve
YTC	Temperature control valve
YVD	Fuel gas regulator

3.3.4 Number

The 3-digit is used to clearly identify the component on the installation.

3.3.5 Part

Components that are installed more than once are considered parts. This guarantees their identity on the installations.

3.4 Component identification

All components are identified as per the diagram. For purposes of identification, two methods are used.

3.4.1 Equipment, valves

Marking on the component. The Tag number is written in a line.



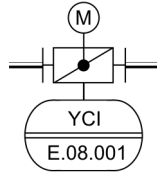
Example: Exhaust silencer marking

P	System (installation)
02	Circuit (exhaust gas)
XSA	Type (silencer)
001	Number



3.4.2 Fittings

Marking of fittings in bubbles on the component. The first line describes component type and function. The second line contains information on position and identity.



Example: Shut-off valve marking

E	System (engine)
08	Circuit (air/fuel-gas mixture)
YCI	Type (valve with position controller)
001	Number

3.5 Installation components



The components actually assembled in this installation are shown in the Technical Diagram and the installation diagrams using the GE Jenbacher tag numbers. A complete list can be found in **Description/Operation** under "Module drawings and Technical diagram in acc. with E 16287". The table presented there contains a description of these components and links these to the circuit diagram.

4 Revision code

Revision history

Index	Date	Description/Revision summary	Author
			<i>Checked</i>
6	11.08.2010	Anpassung Dokumentenstruktur CMS	Provin <i>Provin</i>
5	17.06.2010	Ergänzung Punkt: Bauteilbeschriftung	Provin <i>Tomaschek</i>
4	27.05.2010	Kreis 21 - Wasser (externe Quelle) Kreis 23 - Generator Stator	Provin <i>Steidl</i>
3	19.05.2010	Tag-Nummer Block 5 („Teil“) in der Beschreibung ergänzt	Provin <i>Tomaschek</i>
2	12.04.2010	3.3 - Grafik zur Tagnummer richtig gestellt	Provin <i>Tomaschek</i>
1	19.03.2010	Erstausgabe	Provin <i>Geisler</i>

FLANGE CHART REFERENCE

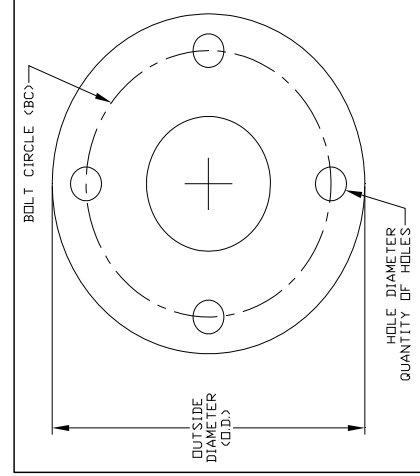
PN6		87 psi		PN10		145 psi		PN16		232 psi		PN25		362 psi		PN40		580 psi			
	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY
10 3/8"	75	50	4 X 11	90	60	4 X 14	90	60	4 X 14	90	60	4 X 14	90	60	4 X 14	90	60	4 X 14	90	60	4 X 14
DIN ANSI																					
15 1/2"	80	55	4 X 11	95 89	65 60	4 X 14 4 X 16	95 89	65 60	4 X 14 4 X 16	95 89	65 67	4 X 14 4 X 16	95 89	65 67	4 X 14 4 X 16	95	65	4 X 14	95	67	4 X 16
DIN ANSI																					
20 3/4"	90	65	4 X 11	105 99	75 70	4 X 14 4 X 16	105 99	75 70	4 X 14 4 X 16	105 117	75 83	4 X 14 4 X 20	105 117	75 83	4 X 14 4 X 20	105	75	4 X 14	117	82	4 X 19
DIN ANSI																					
25 1"	100 108	75 80	4 X 11 4 X 16	115 108	85 80	4 X 14 4 X 16	115 108	85 80	4 X 14 4 X 16	115 124	85 89	4 X 14 4 X 20	115 124	85 89	4 X 14 4 X 20	115	85	4 X 14	124	89	4 X 19
DIN ANSI																					
32 1-1/4"	120 118	90 89	4 X 14 4 X 16	140 118	100 89	4 X 18 4 X 16	140 118	100 89	4 X 18 4 X 16	140 133	100 98	4 X 18 4 X 20	140 133	100 98	4 X 18 4 X 20	140	100	4 X 18	133	98	4 X 19
DIN ANSI																					
40 1-1/2"	130 127	100 98	4 X 14 4 X 16	150 127	110 98	4 X 18 4 X 16	150 127	110 98	4 X 18 4 X 16	150 156	110 114	4 X 18 4 X 23	150 156	110 114	4 X 18 4 X 23	150	110	4 X 18	156	114	4 X 22
DIN ANSI																					
50 2"	140 152	110 121	4 X 14 4 X 20	165 152	125 121	4 X 18 4 X 20	165 152	125 121	4 X 18 4 X 20	165 165	125 127	4 X 18 8 X 20	165 165	125 127	4 X 18 8 X 20	165	125	4 X 18	165	127	8 X 19
DIN ANSI																					
65 2-1/2"	160 178	130 140	4 X 14 4 X 20	185 178	145 140	4 X 18 4 X 20	185 178	145 140	4 X 18 4 X 20	185 190	145 149	4 X 18 8 X 23	185 190	145 149	4 X 18 8 X 23	185	145	4 X 18	190	149	8 X 23
DIN ANSI																					
80 3"	190 190	150 152	4 X 18 4 X 20	200 190	160 152	4 X 18 4 X 20	200 190	160 152	4 X 18 4 X 20	200 210	160 168	4 X 18 8 X 23	200 210	160 168	4 X 18 8 X 23	200	160	4 X 18	210	168	8 X 23
DIN ANSI																					
100 4"	210 229	170 190	4 X 18 8 X 20	220 229	180 190	4 X 18 8 X 20	220 229	180 190	4 X 18 8 X 20	220 254	180 200	4 X 18 8 X 23	220 254	180 200	4 X 18 8 X 23	235	190	4 X 18	273	216	8 X 26
DIN ANSI																					
125 5"	240 254	200 216	4 X 18 8 X 23	250 254	210 216	4 X 18 8 X 23	250 254	210 216	4 X 18 8 X 23	250 279	210 235	4 X 18 8 X 23	250 279	210 235	4 X 18 8 X 23	270	220	4 X 18	330	266	8 X 29
DIN ANSI																					
150 6"	265 279	225 241	4 X 18 8 X 23	285 279	240 241	4 X 22 8 X 23	285 279	240 241	4 X 22 8 X 23	285 318	240 270	4 X 22 12 X 23	285 318	240 270	4 X 22 12 X 23	300	250	4 X 26	355	292	12 X 29
DIN ANSI																					
200 8"	320 343	280 298	4 X 18 8 X 23	340 343	295 298	4 X 22 8 X 23	340 343	295 298	4 X 22 8 X 23	340 381	295 330	4 X 22 12 X 23	340 381	295 330	4 X 22 12 X 23	360	310	12 X 26	419	349	12 X 32
DIN ANSI																					

1-Bar = 14.5 psi = 0.1 Mpa = 100 Kpa = 1.02 Kg/cm²

Dimensions in MM PN = Nominal Pressure in Bars

FLANGE CHART REFERENCE

PN6		87 psi		PN10		145 psi		PN16		232 psi		PN25		362 psi		PN40		580 psi			
	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY	O.D.	B.C	HOLE DIA X QTY
250 10"	375 406	335 362	12 X 18 12 X 26	395 406	350 362	12 X 22 12 X 26	405 445	355 387	12 X 26 16 X 32	425 445	370 387	12 X 30 16 X 32	450 508	385 432	12 X 33 16 X 35	450 508	385 432	12 X 33 16 X 35	450 508	385 432	12 X 33 16 X 35
300 12"	440 482	395 431	12 X 22 12 X 26	445 482	400 431	12 X 22 12 X 26	460 520	410 450	12 X 26 16 X 35	485 520	430 450	16 X 30 16 X 35	485 558	450 489	16 X 33 20 X 35	485 558	450 489	16 X 33 20 X 35	485 558	450 489	16 X 33 20 X 35
350 14"	490 533	445 476	12 X 22 12 X 29	505 533	460 476	16 X 22 12 X 28	520 584	470 514	16 X 26 20 X 35	555 584	490 514	16 X 33 20 X 35	555 603	510 527	16 X 36 20 X 38	555 603	510 527	16 X 36 20 X 38	555 603	510 527	16 X 36 20 X 38
400 16"	540 597	495 540	16 X 22 16 X 29	565 597	515 540	16 X 26 16 X 29	580 648	525 571	16 X 30 20 X 38	620 648	550 571	16 X 36 20 X 38	620 685	585 603	16 X 39 20 X 42	620 685	585 603	16 X 39 20 X 42	620 685	585 603	16 X 39 20 X 42
450 18"	595	550	16 X 22	615 635	565 578	20 X 26 16 X 32	640 710	585 629	20 X 30 24 X 35	670 710	600 629	20 X 36 24 X 35	670 745	610 654	20 X 39 20 X 45	670 745	610 654	20 X 39 20 X 45	670 745	610 654	20 X 39 20 X 45
500 20"	645 698	600 635	20 X 22 20 X 32	670 698	620 635	20 X 26 20 X 32	715 775	650 685	20 X 33 24 X 38	730 775	660 685	20 X 36 24 X 38	730 812	670 733	20 X 42 24 X 45	730 812	670 733	20 X 42 24 X 45	730 812	670 733	20 X 42 24 X 45
600 24"	755	705	20 X 26	780 813	725 749	20 X 30 20 X 35	840 915	770 813	20 X 36 24 X 42	845 915	770 813	20 X 39 24 X 48	845 940	795 838	20 X 48 24 X 51	845 940	795 838	20 X 48 24 X 51	845 940	795 838	20 X 48 24 X 51
900 36"	1075	1020	24 X 30	1115 1168	1050 1086	28 X 33 32 X 41	1125	1050	28 X 39	1185	1090	28 X 48									

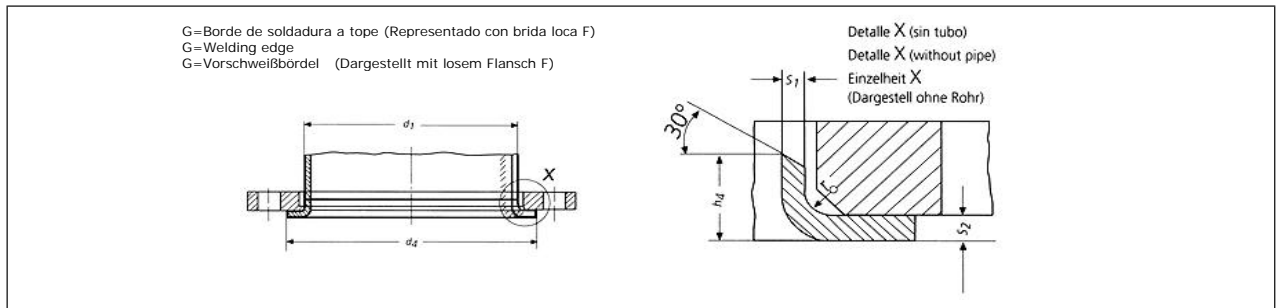
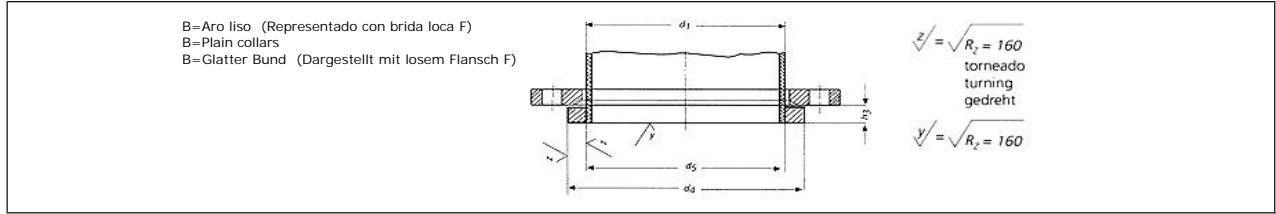
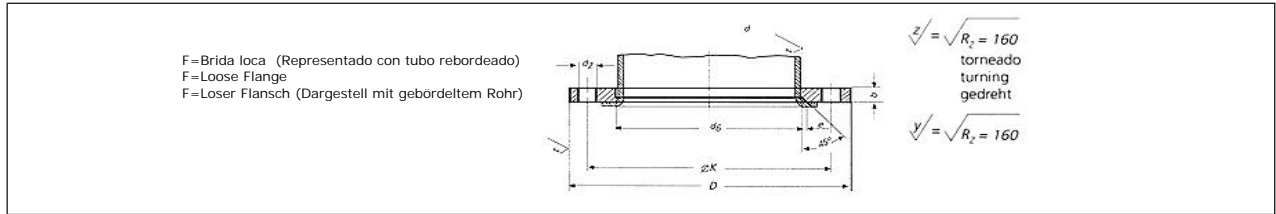


Dimensions in MM PN = Nominal Pressure in Bars

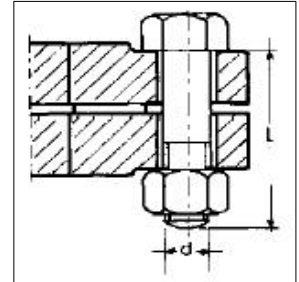
1-Bar = 14.5 psi = 0.1 Mpa = 100 Kpa = 1.02 Kg/cm²

DIN 2642

Lapped flanges Plain collars
Rated pressure 10

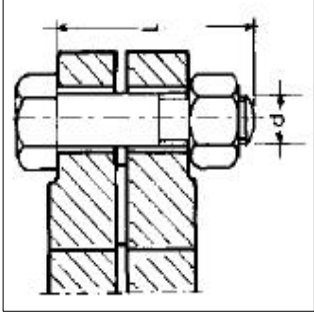


Tubo / Pipe / Rohr - Anschlußmabe		Brida / Flange / Flansch						Tornillos / Screws / Schrauben			Aro y borde / Ring / Bund und Bordel							Peso de una brida / Weight of a flange / Gewicht eines Flansches (7,85 Kg/dm ³) Kg	
Diámetro Nominal Rated Diameter Nennweite	d1		D	d6	b	k	e	Numero / Number / Anzahl	Rosca / Thread / Gewinde	d2	d5	h3	d4 max.	h4 min.	s1 min.	s2 min.	r	Brida / Flange / Flansch	Aro / Ring / Bund
	ISO Serie 1 Reihe 1	DIN Serie 2 Reihe 2																	
10	-	14	90	16	14	60	3	4	M 12	14	14,5	10	40	9	1,8	3	3	0,599	0,087
	17,2	-		19															
15	-	20	95	22	14	65	3	4	M 12	14	21	10	45	9	2	3	3	0,689	0,105
	21,3	-		24															
20	-	25	105	28	14	75	3	4	M 12	14	26	12	58	12	2	3	3	0,806	0,203
	26,9	-		30															
25	-	30	115	33	16	85	4	4	M 12	14	31	12	68	15	2	3	4	1,11	0,276
	33,7	-		36															
32	-	38	140	42	16	100	4	4	M 16	18	39	12	78	15	2,6	3,5	4	1,64	0,343
	42,4	-		46															
40	-	44,5	150	50	16	110	4	4	M 16	18	45,5	12	88	17	2,6	3,5	4	1,86	0,426
	48,3	-		54															
50	-	57	165	62	16	125	5	4	M 16	18	58,1	14	102	23	2,6	3,5	5	2,2	0,618
	60,3	-		65															
65	76,1	-	185	81	16	145	5	4	M 16	18	77,1	14	122	23	2,6	3,5	5	2,62	0,786
80	88,9	-	200	94	18	160	5	8	M 16	18	90,3	16	138	23	3,2	4	5	3,32	1,1
	-	108	220	113	18	180	5	8	M 16	18	109,6	16	158	28	3,2	4	5	3,67	1,31
114,3	-	119																	
125	-	133	250	138	18	210	5	8	M 16	18	134,8	18	188	30	3,2	4	5	4,54	1,96
	139,7	-		145															
150	-	159	285	164	18	240	5	8	M20	22	161,1	18	212	30	3,2	4	5	5,6	2,18
	168,3	-		173															
200	219,1	-	340	225	20	295	5	8	M 20	22	221,8	20	268	30	3,2	4	5	7,46	3,1
250	-	267	395	273	22	350	5	12	M20	22	270,2	22	320	30	4	5	5	10,3	4,22
	273	-		279															
300	323,9	-	445	329	26	400	5	12	M 20	22	327,6	22	370	35	4	5	14	4,85	
350	355,6	-	505	362	28	460	6	16	M 20	22	359,7	22	430	-	-	-	6	18,5	6,71
	-	368		374															
400	406,4	-	565	413	32	515	6	16	M24	26	411	24	482	-	-	-	6	25	8,28
	-	419		426															
(450)	457	-	615	467	38	565	6	20	M24	26	462,5	24	532	-	-	-	6	30,6	9,3
500	508	-	670	517	38	620	6	20	M 24	26	513,6	26	585	-	-	-	6	37	11,5
600	610	-	780	618	44	725	7	20	M 27	30	616,6	26	685	-	-	-	7	56,3	15,6
700	711	-	895	721	50	840	7	24	M27	30	718,6	28	800	-	-	-	7	80,4	23,2
800	813	-	1015	824	56	950	7	24	M30	33	821,5	30	905	-	-	-	7	113,2	29,2



Technical Data Chart
Bolting for DIN flanges: Nominal pressure PN 6 to PN 64 (bar)

DN	PN 6				PN 10				PN 16			
	Nominal size	Quantity	Thread diameter (d)	Underhead Length (L)	wt. grams	Quantity	Thread diameter (d)	Underhead Length (L)	wt. grams	Quantity	Thread diameter (d)	Underhead Length (L)
10	4	10	40	60	4	12	50	95	4	12	50	95
15	4	10	40	60	4	12	50	95	4	12	50	95
20	4	10	45	70	4	12	50	95	4	12	50	95
25	4	10	45	70	4	12	50	95	4	12	50	95
32	4	12	45	90	4	16	60	230	4	16	60	230
40	4	12	45	90	4	16	60	230	4	16	60	230
50	4	12	45	90	4	16	60	230	4	16	60	230
65	4	12	45	90	4	16	60	230	4	16	60	230
80	4	16	60	230	4	16	65	240	8	16	65	240
100	4	16	60	230	8	16	65	240	8	16	65	240
125	8	16	65	240	8	16	70	250	8	16	70	250
150	8	16	65	240	8	20	75	400	8	20	75	400
200	8	16	70	250	8	20	80	420	12	20	80	420
250	12	16	70	250	12	20	85	450	12	24	90	600
300	12	20	75	400	12	20	85	450	12	24	90	800
350	12	20	80	420	16	20	85	450	16	24	95	850
400	16	20	80	420	16	22	85	600	16	27	105	1050
450	16	20	80	420	20	22	85	600	20	27	105	1050
500	20	20	80	420	20	22	90	800	20	30	110	1150
600	20	22	85	600	20	27	95	980	20	33	115	1600
700	24	22	85	600	24	27	100	1000	24	33	115	1600
800	24	27	90	950	24	30	105	1190	24	36x3	135	2200
900	24	27	95	980	28	30	110	1150	28	36x3	135	2200
1000	28	27	95	980	28	33	115	1600	28	39x3	140	2800
1200	32	30	100	1150	32	36x3	125	2100	32	45x3	160	4300
1400	36	33	110	1500	36	39x3	135	2600	36	45x3	165	4350
1600	40	33	115	1600	40	45x3	150	4160	40	52x3	185	6800
1800	44	36x3	120	2000	44	45x3	160	4300	44	52x3	195	6900
2000	49	39x3	130	2500	48	45x3	170	4400	48	56x4	205	8010



**Technical Data Chart
Bolting for DIN flanges: Nominal pressure PN 6 to PN 64 (bar)**

DN	PN 25			PN 40			PN 64					
	Quantity	Thread diameter (d)	Underhead Length (L)	wt. grams	Quantity	Thread diameter (d)	Underhead Length (L)	wt. grams	Quantity	Thread diameter (d)	Underhead Length (L)	wt. grams
10	4	12	50	95	4	12	50	95	4	12	65	130
15	4	12	50	95	4	12	50	95	4	12	65	130
20	4	12	55	100	4	12	55	100	4	16	70	250
25	4	12	55	100	4	12	55	100	4	16	75	280
32	4	16	60	230	4	16	60	230	4	20	80	420
40	4	16	60	230	4	16	60	230	4	20	85	450
50	4	16	65	240	4	16	65	240	4	20	85	450
65	8	16	70	250	8	16	70	250	8	20	85	450
80	8	16	70	250	8	16	70	250	8	20	90	500
100	8	20	75	400	8	20	80	420	8	22	95	900
125	8	22	80	550	8	22	80	550	8	27	110	1090
150	8	22	90	800	8	22	90	800	8	30	115	1200
200	12	22	90	800	12	27	100	1000	12	33	130	1900
250	12	27	100	1000	12	30	110	1150	12	33	140	2050
300	16	27	100	1000	16	30	120	1340	16	33	150	2150
350	16	30	110	1150	16	33	130	1900	16	36x3	165	2500
400	16	33	120	1700	16	36x3	140	2300	16	39x3	175	3150
450	20	33	120	1700	20	36x3	140	2300				
500	20	33	120	1700	20	39x3	150	2900				
600	20	36x3	140	2300	20	45x3	170	4400				
700	24	39x3	150	2900	24	45x3	180	4500				
800	24	45x3	150	4160	24	52x3	200	7000				
900	28	45x3	170	4400	28	52x3	210	7200				
1000	28	52x3	180	6700	28	52x3	220	7400				