Technical data of gas welding process and associated equipment

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Table 1

Aptitude of fuelgases for flame processes

Gas flame process	Acetylene	Propane/Butan	Natural gas	Hydrogen
Welding	+	-	-	(X)
Soldering	+	+	+	+
Brazing	+	+	+	(X)
Heating	+	+	+	(X)
Cutting	+	+	+	+

+ suitable - not suitable (X) suitable with certain restrictions

Table 2

Maximum gas withdrawals

Type of gas	Size of gas cylinder	Maximum withdrawal short-	Remarks temperature-sensitive
Acetylene	40 l 30 l 13,4 l	900 / 500 l/h 600 / 300 l/h 300 / 200 l/h	
Propane/butan	33 kg 10,5 kg 5 kg	3,0 / 1,8 kg/h 1,5 / 0,8 kg/h 1 / 0,5 kg/h	at 15º C, 1,5 bar and middle filling degree
Carbon dioxide	50 l 30 l 13,4 l	2 kg/h 2 kg/h 2 kg/h	at 15º C

Table 3

Suitability of steel for flame cutting

Alloying element	upper cut-off grade
Carbon	up to 0,45 % C, with preheating treatment up to 1,6 % C
Silicon	up to 2,9 % at maximum 0,2 % C
Manganese	up to 13 % at maximum 1,3 % C
Chromium	up to 1,5 %, with preheating up to 10 % at maximum 0,2 C
Tungsten	up to 10 % at maximum 5 % CR, 0,2 % Ni and 0,8 % C
Nickel	up to 7 %, resp. 34 % at maximum 0,5 % C
Molybdenum	up to 0,8 %, at higher tungsten-, chromium-, and carbon contents cutting not possible
Copper	up to 0,7 %

Table 4

Process differences between gas welding and flame brazing

Feature	Gas welding	Flame brazing (split brazing)
Material	Same or similar metals	Any desired metal
Heating-up	localized	Evenly and large area
Temperature level	(high) melting temperature (of base materials)	(low) working temperature (of filler metal)
Heat-up degree	Melting of base material	Temperature ranging below melting point of base materials
Flame	Jet flame	generally a soft, large flame
Nozzle	Standard welding blowpipe nozzle	If necessary special brazing head
Torch movement	straight lined (over the groove)	waving (over a wide range)
Rod movement	Spiral or straight-lined in the groove	Pulling-off of a soldering wire
Appearance of joint	weld beads	smooth

Table 5

Performance values of GLOOR-pressure regulators

Type	Art.-No.	Type of gas	maximum primary pressure (bar)	maximum working pressure	standard performance* (m^3/h) (bar)
Central press.reg. (for cylinder racks)	7900-A 7900-O/ 7950-O	Acetylene Oxygen	approx. 18 200/300	1,5 10	35 180
Pressure regulator (for single cylinder from 10 l)	5100-A 5100-O	Acetylene Oxygen	approx. 18 200	1,5 10	5 30
Mini press. regulator (for single cylinder up to 4 l)	6700-A 6700-O	Acetylene Oxygen	approx. 18 200	1,5 10	2,5 15
Pressure regulator (for single cylinder)	6200/01	Propane	8 (at 20° C)	2 4	9 (16 kg/h) 15 (28 kg/h)
Low pressure regulator	5600 5600 5610 5620 5650	Acetylene Oxygen Oxygen Oxygen Oxygen	1,5 40 	1,5 10 6 20 Fix 4,5	4 20 30 20 0–32 l/min
Low pressure regulator (central pressure regulator pipeline installation)	7901-A 7901-O 7905 7906	Acetylene Oxygen Oxygen Oxygen	1,5 40 50 50	1,5 30 40 12	35 230 450 800
Pressure regulator with flowmeter (for single cylinder)	 4250 5150/5350 6614/6914 6616/6916	Argon Compr.air Forming gas Carbon diox. Oxygen Nitrogen	 200/300 	 Fix 4,5 	 0 – 3 l/min 0–16 l/min 0–32 l/min
Pressure regulator with flow gauge (for single cylinder)	5140/5340	Argon Compr.air Forming gas Carbon diox. Oxygen Nitrogen	 200/300 	 Fix 4,5 	 24 l/min 16 l/min

Table 6

Flame arresting devices

GLOOROTHERM GFN 1500

Art.-No.	Type of gas	Pressure p max. bar	Flow rate** V max. m³/h	Connection	
				Inlet female	Outlet male
1500-O	Oxygen Compressed air	10	100	3/8"	3/8"
1500-A	Acetylene	1,5	16	3/8"L	3/8"L
1500-P	Propane	5	42	3/8"L	3/8"L
1500-H	Hydrogen	5	60	3/8"L	3/8"L

GLOOROTHERM GFN 1800

Art.-No.	Type of gas	Pressure p max. bar	Flow rate** V max. m³/h	Connection	
				Inlet female	Outlet male
1800-O	Oxygen Compressed air	20	210	3/8"	3/8"
1800-A	Acetylene	1,5	26	3/8"L	3/8"L
1800-P	Propane	5	52	3/8"L	3/8"L
	Natural gas/Meth.	0,022 *		3/8"L	3/8"L
1800-H	Hydrogen	5	95		

Table 7

Technical data of GLOOR-welding- and heating heads 3600 and 3900 for acetylene / oxygen

Art.-No.	3909 A	3610 A 3910 A	3611 A 3911 A	3612 A 3912 A	3613 A 3913 A	3614 A 3914 A	3615 A 3915 A	3616 A 3916 A	3917 A	3918 A
Oxygen consumption (l/h) *	80	80	80	150	300	520	750	1130	1740	2450
Acetylene consumption (l/h) *	75	75	75	145	290	500	720	1085	1675	2355
Nominal weld. range (mm-steel)	0,1– 0,2	0,2– 0,5	0,5– 1	1– 2	2– 4	4– 6	6– 9	9– 14	14– 20	20– 30
Calorific performance (kj/h) **	4280	4280	4280	8260	16500	28500	41000	61800	95400	134100
Number acetylene-cylinders 40 l	1	1	1	1	1	1	1	2	2	3

Table 7a

Technical data of GLOOR-welding- and heating heads 3619-22 for acetylene / oxygen

Art.-No.	3619	3620	3622
Oxygen (bar)	2,5	2,5	2,5
Acetylene pressure (bar)	0,6	0,7	1,0
Oxygen consumption (l/h) *	3880	4500	6480
Acetylene consumption (l/h) *	2950	3460	4750
Calorific performance (kJ/h) **	168000	197000	270500
Number acetylene cylinder 40 l	3	4	5

Table 8

Technical data of GLOOR- heating heads 3600 and 3900 for acetylene / oxygen

Art.-No.	3952 A	3654 A 3954 A	3656 A 3956 A	3658 A	3660 A
Oxygen pressure (bar)	1,5	1,5	1,5	1,5	1,5
Oxygen consumption (l/h) *	380	505	800	2130	3230
Acetylene consumption (l/h) *	250	340	630	1640	2485
Calorific performance (kJ/h) **	14200	19300	35000	93400	141500
Number acetylene cylinder 40 l	1	1	1	2	3

Technical data of GLOOR heating heads 3600 and 3900 for acetylene / oxygen and propane/ oxygen

Technical datas GLOOR-heating head 3976-A for acetylene / oxygen

Acetylene pressure:	0,5 bar
Oxygen pressure:	1,5 bar
Acetylene consumption:	700 l/h
Oxygen consumption:	800 l/h
Calorific performance:	39 900 kJ/h

Technical datas GLOOR-heating head 3976-P for propane/ oxygen

Propane pressure:	0,5 bar
Oxygen pressure:	2 bar
Propane consumption:	1,06 kg/h
Oxygen consumption:	2 100 l/h
Calorific performance:	49 200 kJ/h

Table 9

Technical data of GLOOR- heating heads 3600 and 3900 for propane / natural gas- oxygen

Art.-No.	3952 P/M	3654 P/M 3954 P/M	3656 P/M 3956 P/M	3658 P/M	3660 P	3662 P	3664 P
Oxygen pressure (bar)	2,0	2,0	2,0	2,5	2,5	3,0	3,0
Oxygen consumption (l/h) *	450	780	1700	2950	4650	6650	7500
Propane consumption (kg/h) *	0,225	0,365	0,800	1,380	2,180	3,115	3,515
Calorific performance kJ/h) **	10300	17000	37200	64200	101400	144900	163500
Natural gas consumption (l/h) *	260	460	1000	1750	-	-	-
Calorific performance (kJ/h) **	10050	14450	31400	54950	-	-	-
Number Propane cylinder 10,5 kg	1	1	1	1 – 2	2 – 3	3 – 4	3 – 4

Table 10

Technical data of GLOOR-heating heads 3961-64

for propane/ natural gas-compressed air

Art.-No.	3961 P/M	3962 P/M	3963 P/M	3964 P/M
Compressed air consumption (l/h) *	360	530	920	2130
Propane consumption (kg/h) *	0,035	0,050	0,085	0,200
Calorific performance (kJl/h)**	1630	2325	3950	9300
Natural gas consumption (l/h)*	45	65	115	270
Calorific performance (kJl/h)**	1415	2050	3600	8500

Table 11

Jet Flame torches

Oxygen / acetylene

Art.-No.	Flame width mm	Pressure		Consumption*		Number acetylene cylinders 40 L
		02 (bar)	A (bar)	02 (m^3/h)	A (m^3/h)	
3670-A	50	3,0	0,5	0,9	0,8	1
3671-A	100	3,0	0,5	2,7	2,0	2
3672-A	150	3,0	0,7	5,0	2,75	3

Oxygen / propane

Art.-No.	Flame width mm	Pressure		Consumption *		Number propane cylinders 10,5 kg
		02 (bar)	P (bar)	02 (m^3/h)	P (kg/h)	
3670-P	50	4,0	0,6	1,25	0,5	1
3671-P	100	4,0	0,6	2,0	1,1	1
3672-P	150	5,0	1,0	3,75	1,5	2

Table 12

Flame cutting suitability of different steels as a function of alloy constituents

steel	chemical analysis								Suitability for flame cutting (without pre-heating) *
	C %	Si %	Mn %	Cr %	Ni %	Mo %	Cu %	Co %	
St 37	0,2								+
St 52	0,2	0,3	0,6						+
St 70	0,5	0,2	0,4						+
H II	0,2	0,35	0,5						+
15 Mo 3	0,2	0,25	0,6			0,3			+
13CrMo4 4	0,15	0,25	0,55	0,85		0,45			+
10CrMo9 10	0,15	0,32	0,5	2,2		1,0			+
St 35,8	0,18	0,29	0,86	0,57	0,87	0,48			+
StE 70	0,2	0,35	1,5		0,56				+
HY 80	0,14	0,21	0,24	1,3	2,88	0,35	0,1		+
20 MnCrSiMoZr 4 3	0,18	0,76	0,9	0,85		0,36			+
WTSt 37	0,12	0,5	0,3	0,8	0,65		0,4		+
StE 43	0,12	0,4	1,3		0,6		0,6		+
StE 36	0,2	0,3	1,3						+
17 MnMoV6 4	0,19	0,3	1,5		1,0	0,3			+
17 MnCrMo 3 3	0,2	0,71	0,91	0,9	0,07	0,33			+
Perlitarmer Stahl	0,09	0,4	1,3						+
22 NiMoCr 3 7	0,2	0,3	0,8	0,4	0,8	0,7			+
20 MnMoNi 5 5	0,2	0,2	1,2	0,5	0,5	0,5			+
GS-C 25	0,2	0,41	0,69	0,05	0,04		0,08		+
Betonstahl	0,2	0,6							+
X 8 Ni 9	0,06	0,24	0,64		9,08				+
X2 NiCoMo 18 9 5	0,04	0,02	0,02		17,8	4,94		9	-
X 10 Cr 13	0,09	1,0	1,0	13					-
X 20 Cr 13	0,2			13					-
X 4 CrNiMoNb 25 7	0,04			25	7				-
X 10 CrNiTi 18 9	0,1	1,0	2,0	18	9				-
X10 CrNiMoTi 18 10	0,1	1,0	2,0	17,5	11,5	2,25			-
X 8 CrNiNb 19 9	0,08			19	9				-
X 15 CrNiSi 20 12	0,2	2,05	2,0	20	12				-
X 45 NiCrMo 4	0,45	0,25	0,4	1,3	4				-

Table 13

Operational table of GLOOR-monoblock cutting nozzles type 44 for acetylene

Art.-No.	Cutting thickness mm	Nozzle-distance mm	Kerf-width	Oxygen-		Acetylene-	
				pressure bar	consumption * m³/h	pressure bar	consumption * m³/h
4421	3 – 20	4	2,0	2 – 4	1,5 – 2,7		0,20–0,35
4422	20 – 50	5	3,0	4 – 5	4,1 – 4,8	0,3	0,40–0,50
4423	50 – 100	6	4,0	5 – 6	6,2 – 7,9		0,50–0,65
4425	Sheet metal nozzle 2 – 5 mm	3	1,5	1,5 – 2,0	0,9 – 1,1	0,3	0,17–0,22
4450	Gouging nozzle	6,5 – 10 gouging depth	up to 10	5,0 – 6,0	4,8 – 6,2	0,3	0,27–0,48
4451	Rivet cutting nozzle	up to 40 mm 0		3,0 – 4,5	3,3 – 4,6	0,3	0,26–0,38

Table 14

Operational table of GLOOR-monoblock cutting nozzles (flat faced) type 45 for acetylene

Art.-No.	Cutting thickness mm	Nozzle distance mm	Kerf width mm	Oxygen- pressure bar	Oxygen- consumption * m^3/h	Acetylene- pressure bar	Acetylene- consumption * m^3/h
4521	3 – 20	4	2,0	2,0 – 3,0	1,5 – 2,0		0,18–0,22
4522	20 – 40	4	2,5	3,0 – 4,5	2,5 – 3,5	0,3	0,30–0,35
4523	40 – 60	5	3,0	4,5 – 6,0	4,4 – 5,6		0,40–0,50
4425	Sheet metal nozzle 2 – 5 mm	3	1,5	1,5 – 2,0	0,9 – 1,1	0,3	0,17–0,22

Table 15

Operational table of GLOOR-multiple slot nozzles type 44 for propane (two-piece)

Art.-No.	Cutting thickness mm	Nozzle distance mm	Kerf width mm	Oxygen-	consumption * m^3/h	Propane- pressure bar	consumption h* m^3/h
4421-P	3 – 20	4	2	2,5 – 4,0	1,9 – 2,8		0,22–0,38
4422-P	20 – 50	5	3	4,0 – 5,0	4,4 – 5,2	0,2–0,3	0,43–0,47
4423-P	50 – 100	6	4	5,0 – 6,0	6,7 – 8,4		0,47–0,56

Table 16

Operational table of GLOOR-multiple slot nozzles type 45 for propane (two-piece)

Art.-No.	Cutting thickness mm	Nozzle distance mm	Kerf width mm	Oxygen-		Propane-	
				pressure bar	consumption * m^3/h	pressure bar	consumption* m^3/h
4521-P	3 – 20	4	2	2,5 – 3,5	1,9 – 2,5		0,22–0,28
4522-P	20 – 40	5	2,5	3,5 – 5,0	3,1 – 5,0	0,2–0,3	0,38–0,41
4523-P	40 – 60	6	3	5,0 – 6,5	5,0 – 6,5		0,47–0,65

Table 17

Operational table of GLOOR cutting nozzles type Garant for acetylene

Art.-No.	Cutting thickness mm	Nozzle distance mm	Kerf-width mm	Oxygen- pressure bar	consumption *m³/h	Acetylene- pressure bar	Consumption *m³/h
4711	3 – 10	5	1,5	2,0	1,6	0,20	0,37
4712	10 – 25	5	2,0	3,0	3,9	0,20	0,43
4713	25 – 50	5	2,8	3,5	7,0	0,25	0,5
4714	50 – 100	6	3,0	4,0	12,0	0,30	0,63
4715	100 – 150	7	3,5	4,0	16,0		0,7
4716	150 – 200	7	4,0	4,5	23,0	0,5	1,0
4717	200 – 300	8	6,0	4,5	29,0		1,0
4725	Sheet metal nozzle 2 – 5 mm	3	1,0	1,5 – 2,0	0,7 – 1,0		0,14–0,20
4750	Gouging nozzle	6,5 – 10 Fugentiefe	bis 10	5,0 – 6,0	8,6 – 10,5	0,5	0,49–0,88
4751	Rivet cutting nozzle	up to 50 mm 0		3,0 – 4,5	4,5 – 7,3		0,36–0,58

Table 17a

Operational table of Gloor Garant high performance cutting nozzle acetylene

Art.-No.	Cutting thickness mm	Nozzle distance mm	Kerf-width mm	Oxygen- pressure bar	consumption *m³/h	Acetylene- pressure bar	Consumption *m³/h
4770	0 – 5	5	1,0	7	0,75	0,2	0,47
4771	5 – 10	5	1,2	7	1,1	0,2	0,47
4772	10 – 15	5	1,4	7	2,5	0,2	0,55
4773	15 – 30	6	1,7	7	3,8	0,2	0,55
4774	30 – 40	6	2,1	7	5,4	0,2	0,55
4775	40 – 50	7	2,5	7	7,3	0.2	0,68
4776	50 – 100	7	3,1	7	10	0,25	0,78
4777	100 – 150	8	3,6	7	14	0,3	0,86
4778	150 – 250	8	4,5	7	22	0,3	1,21
4479	250 – 300	8	5,8	7	35	0,4	1,45

Table 18

Operational table of GLOOR cutting nozzle type Garant for propane (two-piece)

Art.-No.	Cutting thickness mm	Nozzle distance mm	Kerf-width mm	Oxygen - pressure bar	Oxygen - consumption *m³/h	Propane- pressure bar	Propane- consumption *m³/h
4731	3 – 10	4	1,5	1,5	2,4		0,31
4732	10 – 25	5	2,0	3,0	4,8		0,36
4733	25 – 50	5	2,8	3,5	8,4		0,49
4734	50 – 100	6	3,0	4,0	12,9	0,2–0,3	0,49
4735	100 – 150	7	3,5	4,0	18,0		0,8
4736	150 – 200	7	4,0	4,5	25,7		0,98
4737	200 – 300	8	6,0	4,5	29		0,98

* In relation to 1013 mbar/20° C
average deviation under local conditions ± 5 %

Table 18a

Operational table of Gloor Garant high performance cutting nozzle propane

Art.-No.	Cutting thickness mm	Nozzle distance mm	Kerf-width mm	Oxygen- pressure bar	Oxygen- consumption *m³/h	Propan- pressure bar	Propan- consumption *m³/h
4780	0 – 5	5	1,0	7	0,75	0,2	0,31
4781	5 – 10	5	1,2	7	1,1	0,2	0,31
4782	10 – 15	5	1,4	7	2,5	0,2	0,31
4783	15 – 30	6	1,7	7	3,8	0,25	0,36
4784	30 – 40	6	2,1	7	5,4	0,25	0,36
4785	40 – 50	7	2,5	7	7,3	0,25	0,49
4786	50 – 100	7	3,1	7	10	0,3	0,49
4787	100 – 150	8	3,6	7	14	0,3	0,8
4788	150 – 250	8	4,5	7	22	0,4	0,98
4789	250 – 300	8	5,8	7	35	0,4	0,98

* In relation to 1013 mbar/20° C
average deviation under local conditions ± 5 %

Table 19

Cutting nozzle- and cutting torch assignment

Nozzles/ Art.-Nr.	Quantity	Cutting range (mm)	Remarks to the nozzle versions	Cutting torch	Operating tab.-No.
4520A	3	3 – 60	Set (4521/22/23 A)	Light cutting	20
4525 A	1	2 – 5	Sheet metal nozzle	attachment	20
4520P	3	3 – 60	Set (4521/22/23 P)	(two-tube)	22
4420A	3	3 – 100	Set (4421/22/23 A)	Standard	19
4425 A	1	2 – 5	Sheet metal nozzle	Cutting	19
4450 A	1		Gouging nozzle	attachment	19
4451 A	1		Rivet cutting nozzle	(two-tube)	19
4420 P	3	5 – 100	Set (4421/22/23 P)		21
4711 – 17	7	3 – 300	Nozzle serie	Three-tube-	23
4320 – A	3	5 – 100	Set (4711/12/13/14)		23
4725 A	1	2 – 5	Sheet metal nozzle	Cutting	23
4750 A	1		Gouging nozzle	attachment	23
4751 A	1		Rivet cutting nozzle	and	23
4731 – 37 P	7	3 – 300	Nozzle serie		24
4320 P	3	5 – 100	Set (4731/32/33/34-P)	«Garant»	24

Table 20

Technical data of GLOOR-soldering heads 3900 for propane-oxygen

Article-No.	3911 P	3912 P	3913 P	3914 P	3915 P
Oxygen consumption (l/h) *	450	610	795	1365	1785
Propane consumption (kg/h) *	0,210	0,285	0,375	0,640	0,835
Calorific performance (kJ/h) **	9770	13250	17450	29750	38850

Oxygen pressure: 2,0 bar
Propane pressure: 0,3 bar
Mixture ratio: ≈ 4
* In relation to 1013 mbar/20° C
average deviation under local conditions up to approx.. ± 5 %
** 1 kJ = 0,2388 kcal

Table 21

Technical data of GLOOR-soldering heads 3900 for natural gas-oxygen

Article No.	3911 M	3912 M	3913 M	3914 M	3915 M
Oxygen consumption (l/h) *	170	230	375	550	730
Natural gas-consumption (kg/h) *	100	135	220	325	430
Calorific performance (kJ/h) **	3140	4240	6910	10200	13500

Oxygen pressure: 3,0 bar
Natural gas pressure: 0,2 bar
(pipeline pressure)
mixing ratio: ≈ 1,7
* In relation to 1013 mbar/20° C
average deviation under local conditions up to approx.. ± 5 %
** 1 kJ = 0,2388 kcal

Table 22

Technical data of GLOOR-soldering head 3900 for hydrogen-oxygen

Article No.	3910 H	3911 H	3912 H	3913 H
Oxygen consumption (l/h) *	110	155	215	350
Hydrogen consumption (kg/h) *	275	390	540	875
Calorific performance (kJ/h) **	2960	4200	5810	9420

Oxygen pressure: 2,5 bar
Hydrogen pressure: 0,2 bar
mixing ratio: ≈ 0,40 *
* In relation to 1013 mbar/20° C
average deviation under local conditions up to approx. ± 5 %
** 1 kJ = 0,2388 kcal

Table 23

Technical data of GLOOR-Micro Soldering- and brazing head 3965

Nozzle size	1	2	3
Oxygen consumption (l/h) *	40	60	80
Propane consumption (kg/h) *	0,019	0,028	0,038
Calorific performance (kJ/h) **	900	1350	1800
Natural gas consumption (l/h) *	24	36	48
Calorific performance (kJ/h) **	750	1125	1500
Hydrogen consumption (l/h) *	100	150	200
Calorific performance (kJ/h) **	1075	1600	2150

Oxygen pressure: 0,5 up to 2,0 bar
Propane pressure: 0,3 bar
Natural gas pressure: 0,02 bar (pipeline pressure), mixing ratio: ≈ 1,7 W
Hydrogen pressure: 0,2 bar, mixing ratio: » 4,0
* In relation to 1013 mbar/20° C
average deviation under local conditions up to approx. ± 5 %
** 1 kJ = 0,2388 kcal

Table 24

Technical data of heads to GLOOR acetylene-soldering torch (Art. 3200)

Article-No.	3221	3222	3223	3224	3225	3231	3311	3312	3313
Acetylene Consumption ((l/h) *	25	125	190	500	700	190	55	125	190
Calorific performance (kJ/h) **	1425	7120	10800	28500	39900	10800	3135	7120	10800

Acetylene uniform pressure 0,5 bar *

* In relation to 1013 mbar/20° C
average deviation under local conditions up to approx. ± 5 %

** 1 kJ = 0,2388 kcal

Table 25

Technical data of heads to GLOOR propane soldering torch (Art. 6000)

Article-No.	6010	6011
Propane pressure (bar)	1,0	1,0
Propane consumption (kg/h) *	0,05	0,10
Calorific performance (kJ/h) **	2325	4650

* In relation to 1013 mbar/20° C
average deviation under local conditions up to approx. ± 5 %
** 1 kJ = 0,2388 kcal

Table 26

Technical data of GLOOR heating heads for propane-air

Article-No.		6030 6041	6031	6032	6033	6034
Diameter (mm)		30	40	50	60	70
Propane consumption (kg/h) *		0,30	0,70	1,15	1,75	2,40
Calorific performance (kJ/h) **		13950	32550	53500	81400	111650

Propane uniform pressure 1,0 bar *

* In relation to 1013 mbar/20° C
average deviation under local conditions up to approx. ± 5 %

** 1 kJ = 0,2388 kcal