

Technical brochure

Thermostatic expansion valves T2 / TE2



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Introduction



Thermostatic expansion valves regulate the injection of refrigerant liquid into evaporators. Injection is controlled by the refrigerant superheat. Therefore the valves are especially suitable for

liquid injection in "dry" evaporators where the superheat at the evaporator outlet is proportional to the evaporator load.

Features

- **Large temperature range**
Equally applicable to freezing, refrigeration and air conditioning applications.
- **Interchangeable orifice assembly**
 - easier stocking
 - easy capacity matching
 - better service.
- **Rated capacities from 0.5 to 15.5 kW (0.15 to 4.5 TR) for R22.**
- **Can be supplied with MOP (Max. Operating Pressure)**
Protects the compressor motor against excessive evaporating pressure during normal operation.
- **Stainless steel bulb**
Fast and easy to install.
Good temperature transfer from pipe to bulb.
- **Valves for special temperature ranges can be supplied.**

Technical data

Max. temperature
Bulb, when valve is installed: 100°C
Bulb, element not mounted: 60°C

Max. test pressure
PT = 38 bar

Min. temperature
T 2 → TE 2: -60°C

Max. working pressure
PS/MWP = 34 bar

MOP-points

Refrigerant	Range N	Range NM	Range NL	Range B
	-40°C → +10°C	-40°C → -5°C	-40°C → -15°C	-60°C → -25°C
MOP-point in evaporating temperature t_e and evaporating pressure p_e				
	+15°C / +60°F	0°C / +32°F	-10°C / +15°F	-20°C / -4°F
R22	100 psig/6.9 bar	60 psig/4.0 bar	35 psig/3.5 bar	20 psig/1.5 bar
R407C	95 psig/6.6 bar			
R134a	55 psig/5.0 bar	30 psig/3.1 bar	15 psig/2.1 bar	
R404A/R507	120 psig/9.3 bar	75 psig/6.2 bar	50 psig/4.4 bar	30 psig/3.1 bar

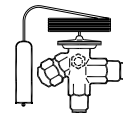
Superheat

- SS = static superheat
- OS = opening superheat
- SH = SS + OS = total superheat
- Q_{nom} = rated capacity
- Q_{max} = maximum capacity

The standard superheat setting SS is 5 K for valves without MOP and 4 K for valves with MOP. The opening superheat OS is 6 K from when opening begins to where the valve gives its rated capacity Q_{nom} .

Static superheat SS can be adjusted with setting spindle.

Example
 Static superheat SS = 5 K
 Opening superheat OS = 6 K
 Total superheat SH = 5 + 6 = 11 K

Ordering, components with flare × flare connection

Thermostatic element with sensor band, without orifice, filter cone, nuts

Refrigerant	Valve type	Pressure equalization ¹⁾	Capillary tube	Connection		Code no.					
				Inlet × outlet ¹⁾		Range N -40 to +10°C		Range NM -40 to -5°C	Range NL -40 to -15°C	Range B -60 to -25°C	
				m	in. × in.	mm × mm	Without MOP	With MOP	With MOP	With MOP	Without MOP
R22/R407C²⁾	TX 2	Int.	1.5	3/8 × 1/2	10 × 12	068Z3206	068Z3208	068Z3224	068Z3226	068Z3207	068Z3228
	TEX 2	Ext.	1.5	3/8 × 1/2	10 × 12	068Z3209	068Z3211	068Z3225	068Z3227	068Z3210	068Z3229
R407C	TZ 2	Int.	1.5	3/8 × 1/2	10 × 12	068Z3496	068Z3516				
	TEZ 2	Ext.	1.5	3/8 × 1/2	10 × 12	068Z3501	068Z3517				
R134a	TN 2	Int.	1.5	3/8 × 1/2	10 × 12	068Z3346	068Z3347	068Z3393	068Z3369		
	TEN 2	Ext.	1.5	3/8 × 1/2	10 × 12	068Z3348	068Z3349	068Z3392	068Z3370		
R404A/R507	TS 2	Int.	1.5	3/8 × 1/2	10 × 12	068Z3400	068Z3402	068Z3406	068Z3408	068Z3401	068Z3410
	TES 2	Ext.	1.5	3/8 × 1/2	10 × 12	068Z3403	068Z3405	068Z3407	068Z3409	068Z3404	068Z3411

¹⁾ See the section "Flare connections".

²⁾ For R407C plants, please select valves from the dedicated R407C program

Flare connections


Connection for copper tubing with outside diameter		Reducer for copper tubing with outside diameter		Code no.
in.	mm	in.	mm	
1/4	6			011L1101
3/8	10			011L1135
1/2	12			011L1103
		1/4	6	011L1107

Example

A TE 2 thermostatic expansion valve consists of two elements + flare nuts if required:

- 1 thermostatic element
- 1 orifice assembly and flare nuts

When ordering one thermostatic expansion valve, TEX 2 with orifice 01, five code numbers are required:

- 1-off thermostatic element, **068Z3209**
- 1-off orifice assembly 01, **068-2010**
- 1-off 3/8 in. flare nut, **011L1135**
- 1-off 1/2 in. flare nut, **011L1103**
- 1-off 1/4 in. flare nut, **011L1101**

Orifice assembly with filter

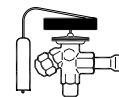
Range N: -40 to +10°C

Orifice no.	Rated capacity in tons (TR)				Rated capacity in kW				Code no. ²⁾
	R22	R407C	R134a	R404A R507	R22	R407C	R134a	R404A R507	
0X	0.15	0.16	0.11	0.11	0.50	0.50	0.40	0.38	068-2002
00	0.30	0.30	0.25	0.21	1.0	1.1	0.90	0.70	068-2003
01	0.70	0.80	0.50	0.45	2.5	2.7	1.8	1.6	068-2010
02	1.0	1.1	0.80	0.60	3.5	3.8	2.6	2.1	068-2015
03	1.5	1.6	1.3	1.2	5.2	5.6	4.6	4.2	068-2006
04	2.3	2.5	1.9	1.7	8.0	8.6	6.7	6.0	068-2007
05	3.0	3.2	2.5	2.2	10.5	11.3	8.6	7.7	068-2008
06	4.5	4.9	3.0	2.6	15.5	16.7	10.5	9.1	068-2009

Range B: -60 to -25°C

Orifice no.	Rated capacity in tons (TR)		Rated capacity in kW		Code no. ²⁾
	R22	R404A R507	R22	R404A R507	
0X	0.15	0.11	0.50	0.38	068-2002
00	0.20	0.21	0.70	0.70	068-2003
01	0.30	0.45	1.0	1.6	068-2010
02	0.60	0.60	2.1	2.1	068-2015
03	0.80	1.0	2.8	3.5	068-2006
04	1.2	1.4	4.2	4.9	068-2007
05	1.5	1.7	5.2	6.0	068-2008
06	2.0	1.9	7.0	6.6	068-2009

 The rated capacity is based on:
 Evaporating temperature $t_e = +5^\circ\text{C}$
 for range N and
 $t_e = -30^\circ\text{C}$ for range B
 Condensing temperature $t_c = +32^\circ\text{C}$
 Refrigerant temperature ahead
 of valve $t_1 = +28^\circ\text{C}$
²⁾ These orifice assemblies cannot be used together with solder adapters. Please see adapter information on next page.


Ordering, components with flare × solder connection
Thermostatic element with sensor band, without orifice, filter cone, nuts

Refrigerant	Valve type	Pressure equalization ³⁾	Capillary tube	Connection				Code no.				
				Inlet Flare	Outlet ODF solder		Range N -40 to +10°C		Range NL -40 to -15°C	Range B -60 to -25°C		
					in. / mm	in.	mm	Without MOP	MOP +15°C	Mop -10°C	Without MOP	MOP -20°C
R22/R407C⁴⁾	TX 2	Int.	1.5	3/8	1/2		068Z3281	068Z3287		068Z3357	068Z3319	
	TX 2	Int.	1.5	10		12	068Z3302	068Z3308	068Z3366	068Z3361	068Z3276	
	TEX 2	Ext.	1.5	3/8	1/2		068Z3284	068Z3290		068Z3359	068Z3320	
	TEX 2	Ext.	1.5	10		12	068Z3305	068Z3311	068Z3367	068Z3363	068Z3277	
R407C	TZ 2	Int.	1.5	3/8	1/2			068Z3329				
	TZ 2	Int.	1.5	10		12	068Z3502	068Z3514				
	TEZ 2	Ext.	1.5	3/8	1/2		068Z3446	068Z3447				
	TEZ 2	Ext.	1.5	10		12	068Z3503	068Z3515				
R134a	TN 2	Int.	1.5	3/8	1/2		068Z3383	068Z3387				
	TN 2	Int.	1.5	10		12	068Z3384	068Z3388				
	TEN 2	Ext.	1.5	3/8	1/2		068Z3385	068Z3389				
	TEN 2	Ext.	1.5	10		12	068Z3386	068Z3390				
R404A/ R507	TS 2	Int.	1.5	3/8	1/2		068Z3414	068Z3416	068Z3429	068Z3418	068Z3420	
	TS 2	Int.	1.5	10		12	068Z3435	068Z3423	068Z3436	068Z3425	068Z3427	
	TES 2	Ext.	1.5	3/8	1/2		068Z3415	068Z3417	068Z3430	068Z3419	068Z3421	
	TES 2	Ext.	1.5	10		12	068Z3422	068Z3424	068Z3437	068Z3426	068Z3428	

³⁾ TE valves with inch outlet have 1/4 inch pressure equalization. TE valves with mm outlet have 6 mm pressure equalization.

⁴⁾ For R407C plants, please select valves from the dedicated R407C program

Solder adaptor


The adaptor is for use with thermostatic expansion valves T 2 and TE 2 with flare × solder connections. When the adaptor is fitted correctly it meets the sealing requirements of DIN 8964.

The adaptor offers the following advantages:

- The orifice assembly can be replaced.
- The filter can be cleaned or replaced.

When using the solder adaptor, a special orifice assembly is required. Please use the following tables to select both the appropriate adaptor and orifice assembly.

Only in this way can the sealing requirements of DIN 8964 be fulfilled.

Solder adaptor for filter drier (FSA) may not be used in the T 2 inlet.

Solder adaptor without orifice assembly and filter

Connection ODF solder	Code no.
1/4 in.	068-2062
6 mm	068-2063
3/8 in.	068-2060
10 mm	068-2061

Filter for solder adaptor

Description	Code no.
Filter excl. orifice assembly	068-0015

Flare connections
See previous page.

Orifice assembly with filter for solder adaptor

Orifice no.	Code no.
0X	068-2089
00	068-2090
01	068-2091
02	068-2092
03	068-2093
04	068-2094
05	068-2095
06	068-2096

For capacities see previous page.

Capacity

R404A / R507

Capacity in kW for range N: -40°C to +10°C

Valve type	Orifice no.	Pressure drop across valve Δp bar								Pressure drop across valve Δp bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
Evaporating temperature +10°C										Evaporating temperature 0°C							
TS 2/TES 2 - 0.11	0X	0.28	0.35	0.40	0.42	0.43	0.43	0.42	0.41	0.30	0.37	0.41	0.42	0.43	0.43	0.43	0.41
TS 2/TES 2 - 0.21	00	0.67	0.82	0.90	0.94	0.96	0.96	0.93	0.90	0.68	0.80	0.87	0.90	0.92	0.93	0.91	0.87
TS 2/TES 2 - 0.45	01	1.7	2.1	2.3	2.4	2.5	2.5	2.4	2.3	1.5	1.9	2.0	2.1	2.2	2.2	2.2	2.1
TS 2/TES 2 - 0.6	02	2.3	3.0	3.4	3.6	3.7	3.7	3.7	3.6	2.1	2.6	3.0	3.1	3.2	3.3	3.2	3.1
TS 2/TES 2 - 1.2	03	4.2	5.4	6.0	6.4	6.6	6.7	6.6	6.4	3.7	4.7	5.3	5.6	5.8	5.8	5.7	5.6
TS 2/TES 2 - 1.7	04	6.2	8.1	9.1	9.7	10.0	10.0	9.8	9.6	5.5	7.1	7.9	8.3	8.6	8.6	8.5	8.3
TS 2/TES 2 - 2.2	05	7.9	10.2	11.4	12.2	12.5	12.6	12.3	12.0	7.0	8.9	10.0	10.5	10.8	10.9	10.8	10.4
TS 2/TES 2 - 2.6	06	9.7	12.5	14.0	14.9	15.3	15.3	15.1	14.7	8.6	10.9	12.2	12.9	13.2	13.3	13.1	12.7
Evaporating temperature -10°C										Evaporating temperature -20°C							
TS 2/TES 2 - 0.11	0X	0.30	0.37	0.40	0.42	0.42	0.42	0.41	0.41		0.35	0.38	0.40	0.39	0.40	0.39	0.38
TS 2/TES 2 - 0.21	00	0.65	0.76	0.82	0.84	0.87	0.87	0.85	0.83		0.70	0.75	0.77	0.79	0.79	0.79	0.76
TS 2/TES 2 - 0.45	01	1.3	1.6	1.7	1.8	1.8	1.9	1.8	1.8		1.3	1.5	1.5	1.5	1.5	1.5	1.5
TS 2/TES 2 - 0.6	02	1.8	2.2	2.5	2.6	2.7	2.7	2.7	2.6		1.9	2.0	2.1	2.2	2.2	2.2	2.1
TS 2/TES 2 - 1.2	03	3.1	4.0	4.5	4.7	4.8	4.8	4.8	4.7		3.3	3.7	3.8	3.9	3.9	3.9	3.8
TS 2/TES 2 - 1.7	04	4.7	6.0	6.6	7.0	7.1	7.2	7.1	6.9		4.9	5.4	5.6	5.8	5.8	5.7	5.6
TS 2/TES 2 - 2.2	05	5.9	7.6	8.4	8.8	9.0	9.1	9.0	8.7		6.2	6.9	7.2	7.3	7.3	7.2	7.1
TS 2/TES 2 - 2.6	06	7.3	9.3	10.3	10.8	11.0	11.1	11.0	10.7		7.6	8.4	8.8	8.9	8.9	8.8	8.6
Evaporating temperature -30°C										Evaporating temperature -40°C							
TS 2/TES 2 - 0.11	0X			0.35	0.37	0.36	0.37	0.36	0.35			0.32	0.33	0.33	0.33	0.32	0.32
TS 2/TES 2 - 0.21	00			0.67	0.70	0.70	0.70	0.69	0.67			0.60	0.61	0.62	0.61	0.60	0.59
TS 2/TES 2 - 0.45	01			1.2	1.2	1.2	1.2	1.2	1.2			0.92	0.96	0.97	0.96	0.94	0.91
TS 2/TES 2 - 0.6	02			1.6	1.7	1.7	1.7	1.7	1.6			1.3	1.3	1.3	1.3	1.3	1.2
TS 2/TES 2 - 1.2	03			2.9	3.0	3.1	3.1	3.0	2.9			2.3	2.4	2.4	2.4	2.3	2.2
TS 2/TES 2 - 1.7	04			4.3	4.5	4.5	4.5	4.5	4.4			3.3	3.5	3.5	3.5	3.4	3.3
TS 2/TES 2 - 2.2	05			5.5	5.7	5.7	5.7	5.7	5.5			4.3	4.4	4.5	4.4	4.4	4.2
TS 2/TES 2 - 2.6	06			6.7	6.9	7.0	7.0	6.9	6.8			5.2	5.4	5.5	5.4	5.3	5.2

Capacity in kW for range B: -60°C to -25°C

Valve type	Orifice no.	Pressure drop across valve Δp bar								Pressure drop across valve Δp bar							
		2	4	6	8	10	12	14	16	2	4	6	8	10	12	14	16
Evaporating temperature -25°C										Evaporating temperature -30°C							
TS 2/TES 2 - 0.21	00	0.57	0.67	0.72	0.73	0.74	0.85	0.74	0.71	0.53	0.64	0.67	0.70	0.70	0.70	0.69	0.67
TS 2/TES 2 - 0.45	01	0.98	1.2	1.3	1.5	1.4	1.4	1.4	1.31	0.88	1.07	1.2	1.2	1.2	1.2	1.2	1.2
TS 2/TES 2 - 0.6	02	1.3	1.7	1.8	1.9	1.9	1.9	1.9	1.9	1.2	1.5	1.6	1.7	1.7	1.7	1.7	1.6
TS 2/TES 2 - 1.0	03	2.4	3.0	3.3	3.4	3.5	3.5	3.4	3.3	2.1	2.7	2.9	3.0	3.1	3.1	3.0	2.9
TS 2/TES 2 - 1.4	04	3.5	4.4	4.8	5.0	5.1	5.1	5.1	4.9	3.1	3.9	4.3	4.5	4.5	4.5	4.5	4.4
TS 2/TES 2 - 1.7	05	4.4	5.6	6.1	6.4	6.5	6.5	6.4	6.3	3.9	4.9	5.5	5.7	5.7	5.7	5.7	5.5
TS 2/TES 2 - 1.9	06	5.4	6.8	7.5	7.8	7.9	7.9	7.9	7.6	4.8	6.1	6.7	6.9	7.0	7.0	6.9	6.8
Evaporating temperature -40°C										Evaporating temperature -50°C							
TS 2/TES 2 - 0.21	00		0.56	0.60	0.61	0.62	0.61	0.60	0.59		0.49	0.53	0.54	0.54	0.53	0.52	0.50
TS 2/TES 2 - 0.45	01		0.85	0.92	0.96	0.97	0.96	0.94	0.91		0.51	0.57	0.60	0.60	0.60	0.60	0.59
TS 2/TES 2 - 0.6	02		1.2	1.3	1.3	1.3	1.3	1.3	1.2		0.91	0.99	1.0	1.0	1.0	0.98	0.95
TS 2/TES 2 - 1.0	03		2.1	2.3	2.4	2.4	2.4	2.3	2.2		1.6	1.8	1.8	1.8	1.8	1.8	1.7
TS 2/TES 2 - 1.4	04		3.0	3.3	3.5	3.5	3.5	3.4	3.3		2.4	2.6	2.7	2.7	2.7	2.6	2.6
TS 2/TES 2 - 1.7	05		3.9	4.3	4.4	4.5	4.4	4.4	4.2		3.0	3.3	3.4	3.5	3.4	3.4	3.3
TS 2/TES 2 - 1.9	06		4.7	5.2	5.4	5.5	5.5	5.3	5.2		3.7	4.0	4.2	4.2	4.2	4.1	4.0
Evaporating temperature -60°C																	
TS 2/TES 2 - 0.21	00			0.46	0.48	0.47	0.45	0.45	0.43								
TS 2/TES 2 - 0.45	01			0.58	0.60	0.60	0.58	0.56	0.54								
TS 2/TES 2 - 0.6	02			0.78	0.80	0.80	0.78	0.75	0.72								
TS 2/TES 2 - 1.0	03			1.4	1.4	1.4	1.4	1.4	1.3								
TS 2/TES 2 - 1.4	04			2.0	2.1	2.1	2.1	2.0	2.0								
TS 2/TES 2 - 1.7	05			2.6	2.7	2.7	2.7	2.6	2.5								
TS 2/TES 2 - 1.9	06			3.2	3.3	3.3	3.3	3.2	3.1								

Correction for subcooling Δt_{sub}

 Note:
 Insufficient subcooling can produce flash gas.

The evaporator capacities used must be corrected if subcooling deviates from 4 K. The corrected capacity can be obtained by

dividing the required evaporator capacity by the correction factor below. Selections can then be made from the tables above.

Δt_{sub}	4 K	10 K	15 K	20 K	25 K	30 K	35 K	40 K	45 K	50 K
Correction factor	1.00	1.10	1.20	1.29	1.37	1.46	1.54	1.63	1.70	1.78

**Design
Function**

General

T 2 and TE 2 valves have an interchangeable orifice assembly.

For the same valve type and refrigerant, the associated orifice assembly is suitable for all versions of valve body and in all evaporating temperature ranges.

The charge in the thermostatic element depends on the evaporating temperature range.

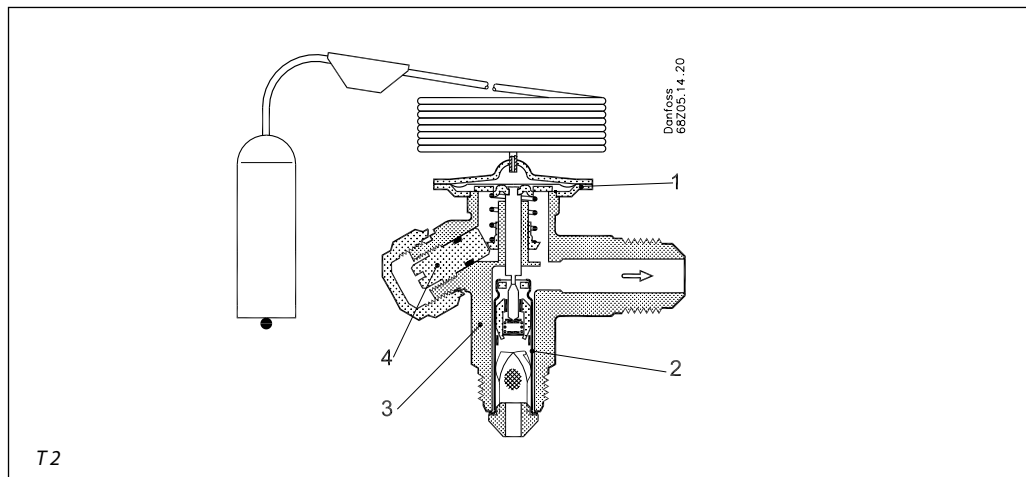
The valves can be equipped with internal (T 2) or external (TE 2) pressure equalization.

External pressure equalization should always be used on systems with liquid distributors.

The double contact bulb gives fast and precise reaction to temperature changes in the evaporator. It also makes fitting the bulb quick and easy.

The valves are able to withstand the effects that normally occur with hot gas defrosting.

To ensure long operating life, the valve cone and seat are made of a special alloy with particularly good wear qualities.



- 1. Thermostatic element (diaphragm)
- 2. Interchangeable orifice assembly
- 3. Valve body
- 4. Superheat setting spindle (see instructions)

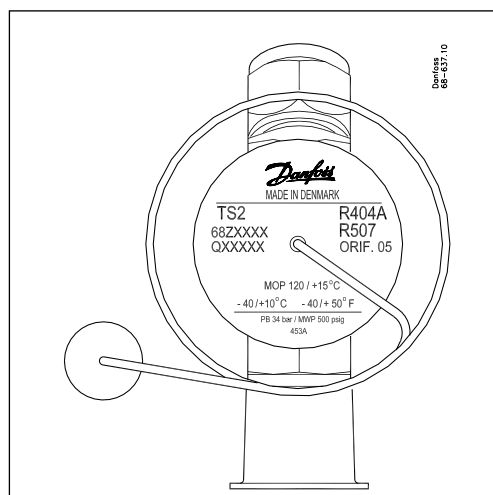
Identification

The thermostatic element is fitted with a laser engraving on top of the diaphragm. This engraving gives valve type (with code number), evaporating temperature range, MOP point, refrigerant, and max. working pressure, PS/MWP.

The code refers to the refrigerant for which the valve is designed:

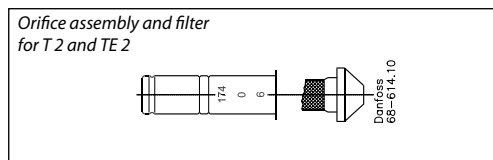
- X = R22/R407C¹⁾
- Z = R407C
- N = R134a
- S = R404A/ R507

¹⁾ For R407C plants, please select valves from the dedicated R407C program



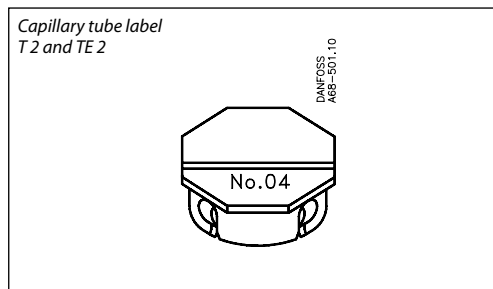
Orifice assembly for T 2 and TE 2

The orifice assembly is marked with the orifice size (e.g. 06) and week stamp + last number in the year (e.g. 174). The orifice assembly number is also given on the lid of its plastic container.



Capillary tube label for T 2 and TE 2

The label gives the orifice size (04) and consists of the lid of the orifice assembly plastic container. It can easily be fastened around the expansion valve capillary tube to clearly identify the valve size.



Dimensions and weights

T 2 and TE 2

Flare × flare

Flare × solder

Solder adaptor

Weight: 0.05 kg / 0.11 lb

	Outlet A	Equalization B	Weight kg / lb
Flare × flare	1/2" flare	1/4" flare	0.3 / 0.7
Flare × solder	1/2" solder 12 mm solder	1/4" solder 6 mm solder	0.3 / 0.7

ODF	
in.	mm
1/4	6
3/8	10

