SAFETY DEVICES

4.3 – SAFETY VALVES IN SERIES 3061

GENERAL DESCRIPTION

Safety valves in series 3061 are considered "Safety Accessories" according to the definition provided in Article 2, Point 4 of said Directive and are subject to the classification indicated in Article 4, Point 1.d) of the same Directive. These valves are unbalanced, conventional direct-loaded safety valves. The valve is opened by the thrust from the fluid under pressure below the shutter, when said thrust exceeds, under the calibrated conditions, the opposing force of the spring acting on the shutter.
Valves are identified by means of:

- A model number formed of an alphanumerical code that includes:
  - The family identity (for ex. 3061/3);
  - The type of inlet connection (for ex. C = NPT);
  - The set pressure, expressed in bar, multiplied by 10 (for ex. 200);
- An alphanumerical serial number.

CONSTRUCTION

Body: squared, obtained through hot moulding and subsequent machining. It houses the following elements:

- The nozzle with flat sealing seat;
- The shutter guide;
- The set spring slot;
- The threaded seat of the setting adjustment ring nut.

In the body, above the shutter guide, a small pressure relief hole is provided through which the spring slot communicates with the exit connection. For this reason, during relief, there is a no gas leak through this orifice.
Material used: EN 12420-CW617N brass.

Shutter: obtained through machining from bar stock and fit with gasket, it ensures the required degree of tightness on the valve seat. The gasket is made from modified PTFE (Polytetrafluorethylene), a material that, during the valve's estimated service life, maintains good strength and does not cause the shutter to stick on the seat. The shutter is properly guided in the body and the guide action cannot fail. There are no glands or retaining rings that hamper its movement.
Material used: EN 12164-CW614N brass.

Spring: it opposes the pressure and the fluid dynamic forces, and always ensures closing of the valve following pressure relief. When the shutter has reached the maximum height determined by the mechanical stop, the spring compression does not exceed 80% of the total compression. All the springs are compliant with the compression helical spring requirements defined in EN ISO 4126-7:2013.
Material used: EN 10270-2 - FD steel for springs.

Calibration system: hex-head threaded ring nut to be screwed inside the upper portion of the head, compressing the spring below. When calibration is complete, the position of the ring nut is maintained unchanged by applying to the threaded coupling a high mechanical strength and low viscosity bonding agent. The low viscosity promotes penetration. The calibration system is protected against subsequent unauthorized interventions by means of a cap nut that is housed into the brass body and is fixed in this seat with an edge calking operation.

SCOPE

Use: protection against possible overpressure of the apparatuses listed below, with regard to the operating conditions for which they have been designed:

- Refrigeration system or heat pump components, for instance: condensers, liquid receivers, evaporators, liquid accumulators, positive displacement compressor discharge, heat exchangers, oil separators, or piping (reference standard: EN 378-2:2016).

Fluids: the valves in series 3061 can be used with:

a. Refrigerant fluids in vapour or gaseous state belonging to Group 2:
- HCFC (R22);
- HFC (R134a, R404A, R407C, R410A, R507);
- HFO and HFO/HFC mixtures (R1234ze, R448A, R449A, R450A, R452A, R513A, R515A, R515B) with reference to Article 13, Para. 1(b) of Directive 2014/68/EU (EC Regulation No. 1272/2008);

b. Air and nitrogen (reference Directive: 2009/105/EC).

For specific applications with refrigerant fluids not listed above, please contact Castel Technical Department.

MARKING

In compliance with the provisions of Article 19 of Directive 2014/68/EU, the following information is reported on the valve body:

- Manufacturer's mark;
- Country of manufacturing;
- Indication of flow direction;
- Maximum allowable pressure;
- Valve model;
- Serial number;
- Set pressure;
- Allowable temperature range;
- Kd discharge coefficient;
- Flow section;
- Production date;
- CE marking;
- Identification number of the notified body involved in the production control phase.


MADE IN
ITALY

DOCUMENTATION

The safety valves in series 3061 are supplied with the following documentation provided in the packaging:

- Operating instructions for the user, containing all information useful for safety in terms of assembly, commissioning, use, and maintenance;
- Declaration of Conformity for the equipment according to Directive 2014/68/EU, required in Article 17 and issued in compliance with Annex IV of the same directive;
- Calibration certificate for the safety valve, printed on the reverse side of the Declaration of Conformity.

N.B.: on the website **www.castel.it** use the "DOWNLOAD" pull-down menu to access to the web-page and then click on the "START HERE" button. Now you are in the "CASTEL DOWNLOAD CENTER" and here you can download:

- The Declaration of Conformity / Calibration Certificate for each valve by entering the 7-digit alphanumeric serial number. (SEARCH BY SERIAL NUMBER);
- The general Declaration of Conformity referring to a specific model of valve 3061 with a specific setting, for ex. 3061/2C250 or 3061/4C420. (SEARCH BY PRODUCT CODE).

VALVE SELECTION

Directive 2014/68/EU requires that pressure equipment, in which permissible limits are reasonably likely to be exceeded, shall be fitted with suitable protection devices, for instance safety devices such as safety valves. Such devices shall prevent pressure from permanently exceeding the maximum allowable pressure (PS) of the equipment they protect. In any case, a short pressure peak limited to 10% of maximum allowable pressure is permitted.

As to the selection and sizing of the suitable protection device, users shall refer to the specific product and sector standards listed below:

- **EN ISO 4126-1:2013**: "Safety devices for protection against excessive pressure – Part 1: Safety valves" indicates the general requirements for safety valves regardless of the fluid for which they were designed;
- **EN 378-2:2016**: "Refrigerating systems and heat pumps – safety and environmental requirements – Part 2: Design, construction, testing, marking and documentation" provides a general outline of the protection devices to be used in refrigerating systems and their characteristics (Para. 6.2.5) and the criteria for the selection of the device suitable for the type and size of the system component to be protected (Para. 6.2.6);
- **EN 13136:2013+A1**: "Refrigerating systems and heat pumps – Pressure relief devices and their associated piping – Methods for calculation" highlights the possible causes of overpressure in a system and provides users with the tools for sizing pressure relief devices, among which safety valves.

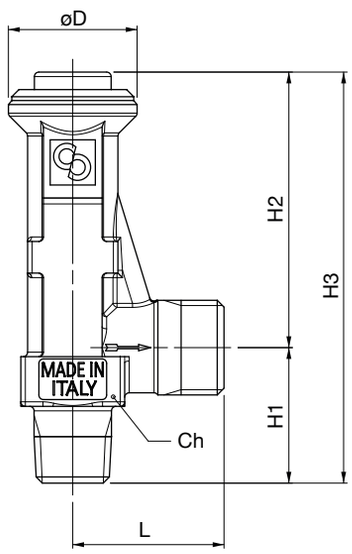
To select the safety valves in series 3061, please see Paragraph 4.5 "Selection Criteria for Safety Valves" in this technical handbook.

VALVE SELECTION

Safety valves type 3061 guarantee repeatable performance. This means that, after the valves have operated, open/close, the initial setting conditions are maintained.

Nevertheless, it is advisable to replace a 3061 valve once it has discharged as during release debris, such as metal shavings or solder impurities, can deposit on the valve gasket. This can inhibit the safety valve from returning to its original conditions.
To calculate the pressure loss in either the upstream line (between vessel and safety valve) or the downstream line (between safety valve and atmosphere) refer to Paragraph 4.5 "Selection Criteria for Safety Valves" in this technical handbook.

3061/2C
3061/3C
3061/4C



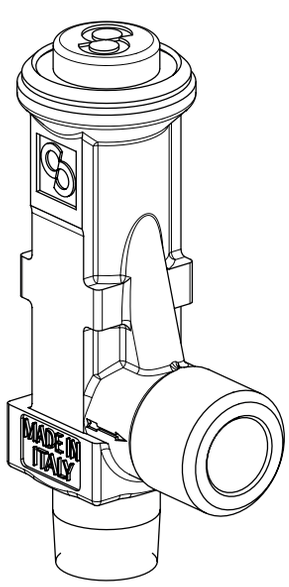


TABLE 12 : GENERAL CHARACTERISTICS OF VALVES 3061

Catalogue Number		3061/2C	3061/3C	3061/4C
Connections	Inlet male	1/4" NPT	3/8" NPT	1/2" NPT
	Outlet male	3/8" G	1/2" G	1/2" G
Inlet connection wrench torque (min/max) [Nm]		15/20	17/22	25/35
Flow Diameter [mm]		7,5	7,5	7,5
Flow Section [mm^2]		44,2	44,2	44,2
Lift [mm]		-	-	-
Discharge Coefficient K_d		0,89	0,89	0,89
PS [bar]		70		
TS [°C]		- 50 / + 150		
Set Pressure Range at atmospheric back pressure P_{set} [bar]		11 / 60		
Overpressure		+ 10 % of P_{set}		
Blowdown		- 15 % of P_{set}		
Helium tightness		- 20 % of P_{set} (11 bar < Pset < 14 bar)		
		- 15 % of P_{set} (14,1 bar < Pset < 24 bar)		
		- 10 % of P_{set} (24,1 bar < Pset < 60 bar)		
Estimated service life		9 years		
Risk Category according to PED Recast		IV		

TABLE 13: DIMENSIONS AND WEIGHTS OF VALVES 3061

Catalogue Number	Dimensions [mm]						Weight [g]
	Ø D	L	Ch	H_1	H_2	H_3	
3061/2C	28,5	33,5	23	30	61	91	200
3061/3C	28,5	33,5	23	30	61	91	230
3061/4C	28,5	33,5	23	35	61	96	260

TABLE 14: MAXIMUM DISCHARGE CAPACITY OF VALVES 3061

P_{set} [bar]	P_o [barsass]	R134a			R22			R404A			R407C			R410A			R448A			R449A	
		k	1,12		k	1,17		k	1,12		k	1,14		k	1,17		k	1,14		k	1,14
		C	2,50		C	2,54		C	2,50		C	2,51		C	2,54		C	2,51		C	2,51
		T_o [°C]	V_6sat [mc/kg]	Q_m [kg/h]	T_o [°C]	V_6sat [mc/kg]	Q_m [kg/h]	T_o [°C]	V_6sat [mc/kg]	Q_m [kg/h]	T_o [°C]	V_6sat [mc/kg]	Q_m [kg/h]	T_o [°C]	V_6sat [mc/kg]	Q_m [kg/h]	T_o [°C]	V_6sat [mc/kg]	Q_m [kg/h]	T_o [°C]	V_6sat [mc/kg]
11,0	13,1	49,8	0,0152	749	33,7	0,0179	702	27,0	0,0144	768	33,9	0,0175	700	16,5	0,0195	671	31,1	0,0172	707	31,0	0,0170
12,0	14,2	53,0	0,0139	815	36,9	0,0164	762	30,2	0,0132	837	36,9	0,0161	761	19,4	0,0179	729	34,1	0,0158	768	34,0	0,0156
13,0	15,3	56,0	0,0128	883	39,9	0,0151	823	33,1	0,0121	908	39,7	0,0148	823	22,1	0,0165	789	36,9	0,0145	832	36,9	0,0143
14,0	16,4	58,9	0,0118	951	42,8	0,0140	885	35,9	0,0111	979	42,4	0,0137	886	24,7	0,0153	849	39,6	0,0134	896	39,5	0,0133
15,0	17,5	61,7	0,0109	1021	45,5	0,0131	948	38,5	0,0103	1051	44,9	0,0127	950	27,2	0,0142	909	42,1	0,0125	958	42,1	0,0123
16,0	18,6	64,3	0,0102	1091	48,1	0,0122	1011	41,0	0,0095	1125	47,3	0,0119	1014	29,5	0,0133	971	44,6	0,0116	1025	44,5	0,0115
17,0	19,7	66,8	0,0095	1163	50,6	0,0115	1075	43,4	0,0089	1201	49,6	0,0111	1079	31,8	0,0124	1033	46,9	0,0108	1093	46,8	0,0107
18,0	20,8	69,2	0,0088	1236	53,0	0,0108	1139	45,7	0,0083	1278	51,8	0,0104	1145	33,9	0,0116	1096	49,1	0,0102	1156	49,1	0,0100
19,0	21,9	71,5	0,0083	1311	55,3	0,0101	1204	48,0	0,0077	1357	54,0	0,0098	1213	36,0	0,0109	1159	51,2	0,0095	1229	51,2	0,0094
20,0	23,0	73,7	0,0078	1387	57,5	0,0096	1271	50,1	0,0072	1439	56,0	0,0092	1281	37,9	0,0103	1224	53,3	0,0090	1294	53,2	0,0089
21,0	24,1	75,9	0,0073	1465	59,7	0,0090	1338	52,1	0,0068	1522	58,0	0,0087	1350	39,9	0,0097	1290	55,2	0,0085	1363	55,2	0,0083
22,0	25,2	77,9	0,0069	1545	61,7	0,0086	1406	54,1	0,0063	1608	59,9	0,0082	1421	41,7	0,0092	1356	57,1	0,0080	1437	57,1	0,0079
23,0	26,3	79,9	0,0065	1627	63,7	0,0081	1475	56,0	0,0059	1698	61,7	0,0077	1492	43,5	0,0087	1424	58,9	0,0075	1516	58,9	0,0074
24,0	27,4	81,9	0,0061	1711	65,7	0,0077	1545	57,9	0,0056	1790	63,4	0,0073	1566	45,2	0,0082	1493	60,7	0,0071	1590	60,7	0,0070
25,0	28,5	83,7	0,0057	1798	67,6	0,0073	1616	59,7	0,0052	1887	65,2	0,0069	1641	46,9	0,0078	1563	62,4	0,0067	1670	62,4	0,0066
26,0	29,6	85,6	0,0054	1888	69,4	0,0070	1689	61,4	0,0049	1988	66,8	0,0066	1717	48,5	0,0074	1635	64,1	0,0064	1741	64,1	0,0063
27,0	30,7	87,3	0,0051	1982	71,2	0,0066	1763	63,1	0,0045	2096	68,4	0,0062	1796	50,1	0,0071	1708	65,7	0,0060	1831	65,7	0,0060
28,0	31,8	89,0	0,0048	2079	72,9	0,0063	1838	64,7	0,0042	2211	70,0	0,0059	1876	51,6	0,0067	1783	67,2	0,0057	1912	67,2	0,0056
29,0	32,9	90,7	0,0045	2182	74,6	0,0060	1915	66,3	0,0039	2336	71,5	0,0056	1959	53,1	0,0064	1860	68,7	0,0054	1998	68,7	0,0053
30,0	34,0	92,3	0,0042	2290	76,2	0,0057	1994	67,8	0,0036	2475	72,9	0,0053	2044	54,6	0,0061	1938	70,2	0,0051	2090	70,2	0,0051
31,0	35,1	93,9	0,0039	2406	77,8	0,0055	2075	69,3	0,0033	2637	74,4	0,0051	2132	56,0	0,0058	2019	71,6	0,0049	2167	71,6	0,0048
32,0	36,2	95,4	0,0037	2532	79,4	0,0052	2158	70,7	0,0029	2845	75,7	0,0048	2224	57,4	0,0055	2102	73,0	0,0046	2271	73,0	0,0045
33,0	37,3	96,9	0,0034	2672	80,9	0,0050	2244	72,1	0,0022	3294	77,1	0,0045	2319	58,7	0,0052	2189	74,3	0,0043	2384	74,3	0,0043
34,0	38,4	98,3	0,0031	2836	82,4	0,0047	2332				78,4	0,0043	2419	60,1	0,0050	2278	75,6	0,0041	2478	75,6	0,0040
35,0	39,5	99,2	0,0029	2977	83,9	0,0045	2424				79,7	0,0041	2525	61,4	0,0047	2371	76,9	0,0038	2610	76,9	0,0037
36,0	40,6	99,5	0,0028	3052	85,3	0,0043	2519				80,9	0,0038	2638	62,6	0,0045	2468	78,1	0,0036	2719	78,1	0,0035
37,0	41,7	99,7	0,0028	3132	86,7	0,0041	2619				82,1	0,0036	2761	63,8	0,0042	2571	79,2	0,0033	2878	79,2	0,0032
38,0	42,8				88,0	0,0039	2724				83,2	0,0033	2896	65,0	0,0040	2681	80,3	0,0030	3058	80,3	0,0029
39,0	43,9				89,4	0,0037	2836				84,3	0,0031	3052	66,2	0,0038	2798				80,7	0,0019
40,0	45,0				90,7	0,0035	2957				85,3	0,0028	3246	67,4	0,0035	2928					
41,0	46,1				92,0	0,0032	3090				86,1	0,0024	3567	68,5	0,0033	3074					
42,0	47,2				93,2	0,0030	3242							69,6	0,0030	3248					
43,0	48,3				94,4	0,0028	3427							70,7	0,0027	3488					
44,0	49,4				95,6	0,0024	3705														
45,0	50,5																				
46,0	51,6																				
47,0	52,7																				
48,0	53,8																				
49,0	54,9																				
50,0	56,0																				
51,0	57,1																				
52,0	58,2																				
53,0	59,3																				
54,0	60,4																				
55,0	61,5																				
56,0	62,6																				
57,0	63,7																				
58,0	64,8																				
59,0	65,9																				
60,0	67,0																				

	R450A			R452A			R507			R513A			R515A			R515B			R1234ze		
	k	1,11		k	1,11		k	1,10		k	1,11		k	1,10		k	1,10		k	1,07	
	C	2,49		C	2,49		C	2,48		C	2,49		C	2,48		C	2,48		C	2,45	
Q_m [kg/h]	T_0 [°C]	V_0sat [mc/kg]	Q_m [kg/h]	T_0 [°C]	V_0sat [mc/kg]	Q_m [kg/h]	T_0 [°C]	V_0sat [mc/kg]	Q_m [kg/h]	T_0 [°C]	V_0sat [mc/kg]	Q_m [kg/h]	T_0 [°C]	V_0sat [mc/kg]	Q_m [kg/h]	T_0 [°C]	V_0sat [mc/kg]	Q_m [kg/h]	T_0 [°C]	V_0sat [mc/kg]	Q_m [kg/h]
711	55,2	0,0144	766	28,7	0,0140	776	25,8	0,0142	769	47,9	0,0139	780	61,4	0,0133	795	61,18	0,0134	791	61,1	0,0139	768
773	58,5	0,0131	836	31,8	0,0128	845	28,9	0,0129	838	51,3	0,0127	850	64,9	0,0121	866	64,6	0,0122	863	64,5	0,0127	837
836	61,7	0,0121	903	34,6	0,0118	915	31,9	0,0119	909	54,4	0,0116	921	68,1	0,0111	939	67,83	0,0112	935	67,7	0,0116	907
901	64,6	0,0111	976	37,4	0,0109	986	34,7	0,0109	980	57,4	0,0107	994	71,1	0,0102	1013	70,89	0,0103	1009	70,8	0,0107	979
966	67,5	0,0103	1047	39,9	0,0101	1058	37,3	0,0101	1053	60,2	0,0099	1067	74,1	0,0094	1089	73,8	0,0096	1080	73,7	0,0099	1051
1031	70,1	0,0096	1118	42,4	0,0094	1131	39,8	0,0094	1127	62,9	0,0092	1143	76,8	0,0088	1166	76,57	0,0089	1156	76,5	0,0092	1126
1098	72,7	0,0089	1195	44,7	0,0087	1205	42,2	0,0087	1203	65,4	0,0085	1220	79,5	0,0081	1245	79,22	0,0082	1240	79,1	0,0085	1201
1166	75,2	0,0083	1271	47,0	0,0082	1281	44,5	0,0081	1280	67,9	0,0080	1299	82,0	0,0076	1326	81,76	0,0077	1315	81,7	0,0079	1279
1235	77,5	0,0078	1346	49,1	0,0077	1358	46,8	0,0076	1360	70,3	0,0074	1379	84,5	0,0071	1409	84,19	0,0071	1405	84,1	0,0074	1358
1305	79,8	0,0073	1426	51,2	0,0072	1437	48,9	0,0071	1441	72,5	0,0069	1462	86,8	0,0066	1494	86,54	0,0067	1482	86,4	0,0069	1440
1376	82,0	0,0068	1512	53,2	0,0067	1518	50,9	0,0066	1525	74,7	0,0065	1548	89,1	0,0062	1582	88,79	0,0062	1577	88,7	0,0065	1524
1449	84,1	0,0064	1594	55,1	0,0063	1601	52,9	0,0062	1612	76,8	0,0061	1636	91,2	0,0058	1673	90,97	0,0058	1667	90,9	0,0061	1611
1523	86,2	0,0060	1682	57,0	0,0060	1686	54,8	0,0058	1702	78,9	0,0057	1728	93,3	0,0054	1768	93,07	0,0055	1749	93,0	0,0057	1701
1599	88,1	0,0056	1777	58,7	0,0056	1774	56,7	0,0054	1795	80,8	0,0053	1823	95,4	0,0050	1867	95,11	0,0051	1854	95,0	0,0053	1795
1677	90,1	0,0053	1862	60,5	0,0053	1864	58,5	0,0051	1893	82,7	0,0050	1923	97,3	0,0047	1971	97,07	0,0048	1949	97,0	0,0050	1893
1757	91,9	0,0050	1954	62,1	0,0050	1958	60,2	0,0048	1995	84,6	0,0046	2028	99,2	0,0044	2081	98,98	0,0044	2075	98,9	0,0046	1997
1838	93,7	0,0046	2075	63,7	0,0047	2055	61,9	0,0044	2104	86,4	0,0043	2140	101,1	0,0041	2199	100,83	0,0041	2189	100,7	0,0043	2107
1923	95,4	0,0043	2184	65,3	0,0044	2157	63,5	0,0041	2221	88,1	0,0040	2262	102,9	0,0038	2329	102,61	0,0038	2314	102,5	0,0040	2226
2009	97,1	0,0040	2303	66,8	0,0041	2265	65,1	0,0038	2349	89,8	0,0037	2395	104,6	0,0034	2475	104,35	0,0035	2453	104,3	0,0037	2358
2099	98,8	0,0038	2402	68,3	0,0039	2379	66,6	0,0035	2492	91,4	0,0034	2548	106,3	0,0031	2649	106,03	0,0032	2607	106,0	0,0034	2508
2192	100,3	0,0035	2543	69,7	0,0036	2506	68,1	0,0032	2663	93,0	0,0030	2738	107,9	0,0027	2894	107,65	0,0028	2832	107,6	0,0030	2695
2292	101,9	0,0031	2745	68,3	0,0005	6559	69,6	0,0028	2893	94,5	0,0025	3053							109,2	0,0025	3023
2390				72,3	0,0031	2793															
2508				73,5	0,0028	2980															
2629																					
2760																					
2909																					
3090																					
3884																					