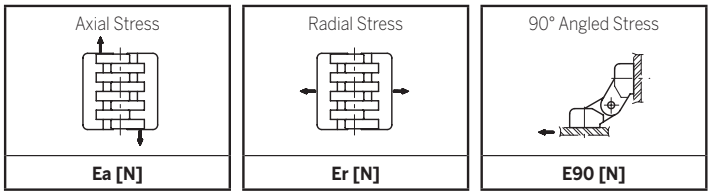
Guidelines for the correct application of plastic hinges

Materials of different type are used in accordance with the different structure and functionality of the hinges:

- High-resilience elastomer based technopolymer.
- Glass-fibre reinforced polyamide based or acetal based technopolymer.
- High-rigidity SUPER-technopolymer.

Resistance tests: two values are supplied for each product code:

- **Maximum working load (Ea, Er, E90)** is the value under which any elastic deformation that may occur is not permanent thus ensuring the hinge functionality.
- **Load at breakage (Ra, Rr, R90)** above which the plastic material can break.



For materials with high rigidity (SUPER-technopolymer) which are not significantly deformed even with loads very close to loads at breakage, only the max limit static load is given (Sa, Sr, S90). Therefore, the technical designer, when calculating the admissible load, will have to use a suitable factor according to the importance and the safety level of the specific situation.

All the values shown in the tables **(Ea, Er, E90 e Sa, Sr, S90)** are the result of tests for the corresponding stresses carried out in our laboratories under controlled temperature and humidity (23° C - 50% R.H.) under given conditions of use and for a limited period of time.
When assessing the safety factor to apply, the technical designer shall take into consideration the actual conditions of use if they are different from the laboratory ones.
In order to help the technical designer to choose the right hinge and check its suitability to the specific application, we suggest asking for test samples and submitting the chosen product to tests in order to check its suitability.

The methods for calculating and interpreting the resistance values described in this catalogue have been updated in accordance with the latest improvements achieved.

Hinges CFN. and CFO. series: **E90** stress is not applicable, due to their geometry and structure.
CFSQ. and CFSW. hinges with built-in safety switch: being safety devices with specific properties, they require a specific argumentation which is illustrated in the product datasheet.

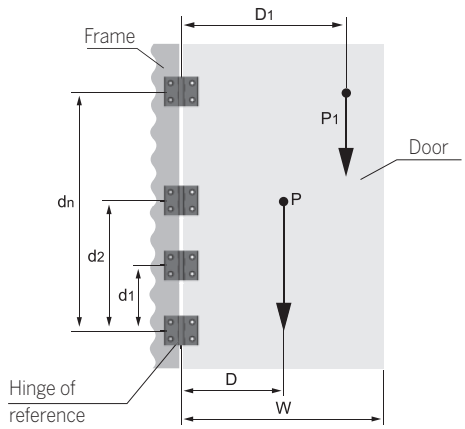
LOAD SUITABILITY CHECK
Hinged door on a vertical axis

P = weight of the door [Newton]
P1 = additional extra load [Newton]
W = width of the door
D = distance [metres] between the centre of gravity of the door and the hinge axis. In normal conditions D = W/2
D1 = distance [metres] between the hinge axis and the additional extra load application point
N = number of hinges
dT = sum of the distances in metres of all the hinges from the hinge of reference (dT = d1+d2+...+dn).
In case of only two hinges assembled, dT is simply the distance between them.
The three conditions must be satisfied.

$$\frac{(P+P1)}{N} \leq Ea$$

$$\frac{[(P \cdot D) + (P1 \cdot D1)]}{dT} \leq Er \text{ (closed door)}$$

$$\frac{[(P \cdot D) + (P1 \cdot D1)]}{dT} \leq E90 \text{ (90° open door°)}$$



Suggestions for a correct assembly
The correct assembly of the hinges requires a drilling on the mounting wall with diameter not wider than 0.5 mm of the diameter of the assembling screw in order to leave the least clearance possible. The suggested tightening torque should not be exceeded.

EXAMPLE

P = 10 Kg = **98 N** (10•9.81) weight of the door
P1 = 2 Kg = **20 N** (2•9.81) weight of the additional extra load applied (for example: handle, lock, machine control panel fitted onto the door)
W = 1 m width of the door
D = W/2 = 1/2 = **0.5 m** distance between the centre of gravity of the door and the hinge axis
D1 = **0.90 m** distance between the hinge axis and the additional extra load application point
N = **2** (evaluating use of two hinges)
dT = **1.3 m** (in this case it is simply the distance between the two hinges)

$$\frac{(P+P1)}{N} = \frac{(98+20)}{2} = 59N \leq Ea$$

$$\frac{[(P \cdot D) + (P1 \cdot D1)]}{d_T} = \frac{[(98 \cdot 0.5) + (20 \cdot 0.9)]}{1.3} = 51N \leq Er$$

$$\frac{[(P \cdot D) + (P1 \cdot D1)]}{dT} = \frac{[(98 \cdot 0.5) + (20 \cdot 0.9)]}{1.3} = 51N \leq E90$$

The suitable hinge can be chosen among those which present Ea, Er, E90 values higher than the calculated ones.
Take CFD., series for example, the suitable hinges are CFD.30 B-M3 and CFD.30 CH-B-M3, CFD.40 B-M4, CFD.40 CH-4-B-M4 and CFD.40 CH-4-p-M4x18, all CFD.48 and CFD.66.

Hinges CFD series satisfying the three conditions indicated in the example above.

Resistance tests		Axial stress		Radial stress		90° Angled Stress	
		Maximum working load	Load at breakage	Maximum working load	Load at breakage	Maximum working load	Load at breakage
Code	**Description**	**Ea [N]**	**Ra [N]**	**Er [N]**	**Rr [N]**	**E90 [N]**	**R90 [N]**
422711	CFD.30 B-M3	60	690	70	490	60	500
422721	CFD.30 p-M3x13	70	750	40	340	30	390
422731	CFD.30 p-M3x13-B-M3	60	690	40	340	30	390
422741	CFD.30 B-M3-p-M3x13	60	690	40	340	30	390
422751	CFD.30 CH-3-B-M3	100	830	110	720	70	670
422761	CFD.30 CH-3-p-M3x13	60	730	50	450	30	350
422811	CFD.40 B-M4	160	1710	150	1340	100	700
422821	CFD.40 p-M4x18	110	1230	140	880	50	730
422831	CFD.40 p-M4x18-B-M4	110	1230	140	880	50	700
422841	CFD.40 B-M4-p-M4x18	110	1230	140	880	50	700
422851	CFD.40 CH-4-B-M4	120	162	150	1220	130	1110
422861	CFD.40 CH-4-p-M4x18	150	1480	140	820	100	860
422911	CFD.48 B-M5	260	2440	260	1700	120	1640
422921	CFD.48 p-M5x17	290	1770	240	1840	110	1740
422931	CFD.48 p-M5x17-B-M5	260	1770	240	1700	110	1640
422941	CFD.48 B-M5-p-M5x17	260	1770	240	1700	110	1640
422951	CFD.48 CH-5-B-M5	330	2530	240	1890	290	1870
422961	CFD.48 CH-5-p-M5x17	150	2170	120	1200	110	970
423011	CFD.66 B-M6	450	4130	320	2520	220	2250
423021	CFD.66 p-M6x16	470	3260	260	1700	240	1580
423031	CFD.66 p-M6x16-B-M6	450	3260	260	1700	220	1580
423041	CFD.66 B-M6-p-M6x16	450	3260	260	1700	220	1580
423051	CFD.66 CH-6-B-M6	430	3660	410	2610	310	2830
423061	CFD.66 CH-6-p-M6x16	350	3090	280	1770	180	1610