Guidelines for the right application of plastic hinges

The following guidelines help you to choose the convenient type and the right number of hinges according to the door to be hinged. Technical designers should consider the values **Er, Ea, E90** reported in the table of every plastic hinge. Maximum working load **(Er, Ea, E90)** is the value at which elastic deformation remains neglectable during functioning. Load at breakage **(Rr, Ra, R90)** should be used for safety verification, if required.
In case of use of CFN. and CFO. hinges, considering the geometry and the structure of such elements, **E90** value is not to be taken into consideration. So the conditions here under reported, where **E90** appears, are not valid.

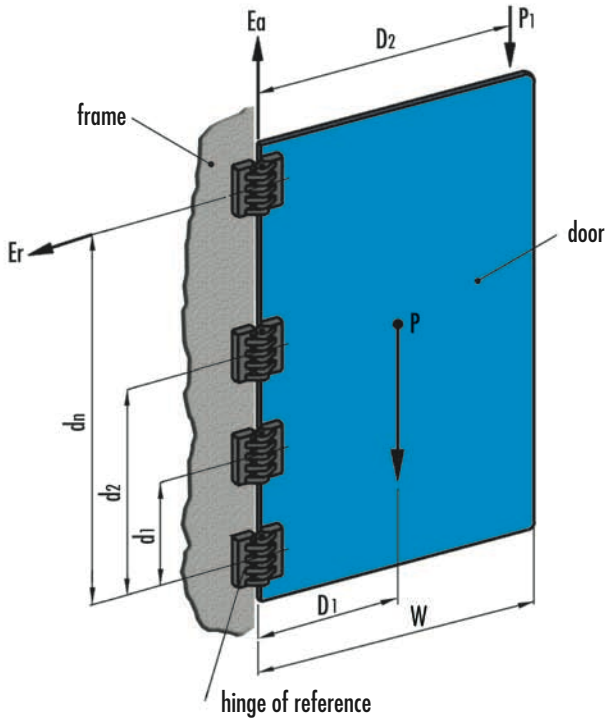
Hinged door on a vertical axis

These are the three conditions to be verified:

$[(P \cdot D_1)+(P_1 \cdot D_2)] / D_3 \leq Er$ with closed door

$(P+P_1) / N \leq Ea$

$[(P \cdot D_1)+(P_1 \cdot D_2)] / D_3 \leq E90$ with 90° open door (*)



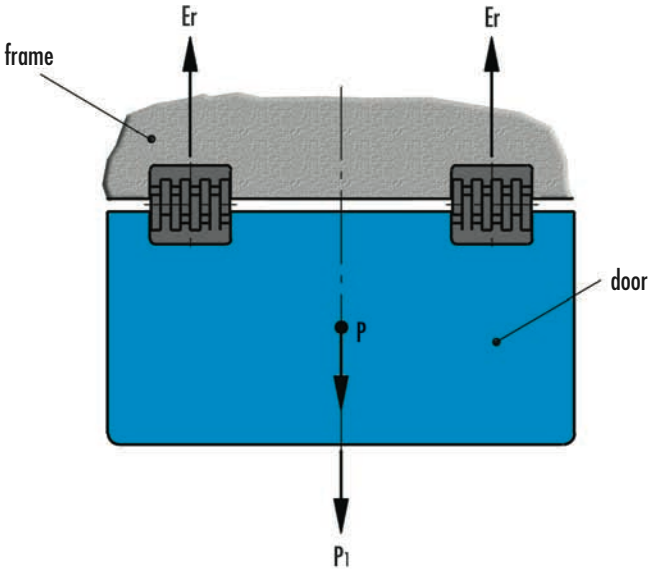
P = weight of the door [Newton]
P_1 = additional extra load applied (if any) [Newton]
N = number of hinges
W = width of the door
D_1 = distance [metres] between the centre of gravity of the door and the hinge axis. In normal conditions $D_1 = W/2$
D_2 = distance [metres] between the hinge axis and additional extra load application point
D_3 = sum of the distances [metres] of all the hinges from the hinge of reference ($D_3 = d1+d2+...+dn$). In case of only two hinges assembled D_3 is simply the distance between them.

Hinged door on a horizontal axis

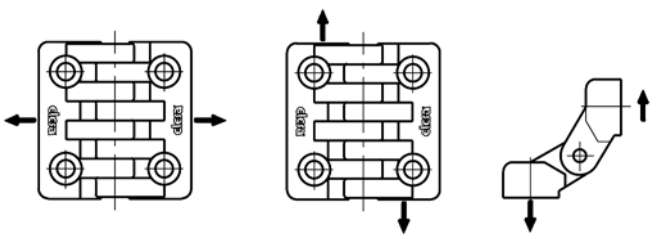
These are the two conditions to be verified:

$(P+P_1) / N \leq Er$ with closed door

$(P+P_1) / 2N \leq E90$ with 90° open door (*)
(in the case of balanced additional extra load on the door)



Er = maximum working radial load of the hinge [Newton]
Ea = maximum working axial load of the hinge [Newton]
E90 = maximum working load with 90° open door hinge [Newton] (*).



Radial strength | Axial strength | 90° Angled strength

SUGGESTIONS FOR DRILLING FITTING HOLES

The proper application of hinges with moulded-in studs or bushings requires a drilling on the mounting wall with diameter not wider than 0.5 mm of the major diameter of the assembling screw in order to guarantee an adequate shoulder of the metal insert on the wall itself.

NOTES

All the values reported in the tables are the result of tests carried out in our laboratories under controlled temperature and humidity (23° C - 50% RH) in given conditions of use and for a relatively limited time.
The technical designer should consider to use an adequate safety factor for particularly heavy conditions of use.

(*) Not valid for CFN. and CFO. series.

EXAMPLE

P = 10 Kg = **98 N** (10•9.81) weight of the door
P_1 = 5 Kg = **49 N** (5•9.81) weight of the additional extra load applied (for example: handle + lock + machine control panel fitted onto the door)
N = **2** (start evaluating two hinges)
W = 1.6 m width of the door
D_1 = W/2 = 1.6/2 = **0.8 m** distance between the centre of gravity of the door and the hinge axis.
D_2 = **1.2 m** distance between the hinge axis and additional extra load application point
D_3 = **1.8 m** (the example shows only the distance between the two assembled hinges).

$[(P \cdot D_1) + (P_1 \cdot D_2)]/D_3 \leq$ Er with closed door
[(98•0.8)+(49•1.2)]/1.8 = **76 N ≤ Er**

$(P+P_1)/N \leq$ Ea
(98+49)/2 = **73.5 N ≤ Ea**

$[(P \cdot D_1) + (P_1 \cdot D_2)]/D_3 \leq$ E90 with 90° open door
[(98•0.8)+(49•1.2)]/1.8 = **76 N ≤ E90 (*)**

(*) Not valid for CFN. and CFO. series.

Considering for example CFD. series, the right dimension can be chosen amongst the hinges with **Er, Ea and E90** values exceeding the values calculated, that are **CFD.40 B-M4, CFD.40 CH-4-B-M4, CFD.40 CH-4-p-M4x18** or any **CFD.48 and CFD.66.**
Always check the maximum tightening torque specification before assembly.

Hinges which satisfy the three conditions mentioned above

Code	Description	RADIAL STRENGTH		AXIAL STRENGTH		90° ANGLED STRENGTH		Maximum tightening torque [Nm]		
		Maximum working load Er [N]	Load at breakage Rr [N]	Maximum working load Ea [N]	Load at breakage Ra [N]	Maximum working load E90 [N]	Load at breakage R90 [N]	SH/CH	B	p
422711	CFD.30 B-M3	70	490	60	690	60	500	-	1	-
422721	CFD.30 p-M3x13	40	340	70	750	30	390	-	-	1
422731	CFD.30 p-M3x13-B-M3	40	340	60	690	30	390	-	1	1
422741	CFD.30 B-M3-p-M3x13	40	340	60	690	30	390	-	1	1
422751	CFD.30 CH-3-B-M3	110	720	100	830	70	670	0.5	1	-
422761	CFD.30 CH-3-p-M3x13	50	450	60	730	30	350	0.5	-	1
422811	CFD.40 B-M4	150	1340	160	1710	100	700	-	4	-
422821	CFD.40 p-M4x18	140	880	110	1230	50	730	-	-	1.5
422831	CFD.40 p-M4x18-B-M4	140	880	110	1230	50	700	-	4	1.5
422841	CFD.40 B-M4-p-M4x18	140	880	110	1230	50	700	-	4	1.5
422851	CFD.40 CH-4-B-M4	150	1220	120	162	130	1110	1	4	-
422861	CFD.40 CH-4-p-M4x18	140	820	150	1480	100	860	1	-	1
422911	CFD.48 B-M5	260	1700	260	2440	120	1640	-	>5	-
422921	CFD.48 p-M5x17	240	1840	290	1770	110	1740	-	-	3
422931	CFD.48 p-M5x17-B-M5	240	1700	260	1770	110	1640	-	>5	3
422941	CFD.48 B-M5-p-M5x17	240	1700	260	1770	110	1640	-	>5	3
422951	CFD.48 CH-5-B-M5	240	1890	330	2530	290	1870	2	-	-
422961	CFD.48 CH-5-p-M5x17	120	1200	150	2170	110	970	2	-	3
423011	CFD.66 B-M6	320	2520	450	4130	220	2250	-	5	-
423021	CFD.66 p-M6x16	260	1700	470	3260	240	1580	-	-	>5
423031	CFD.66 p-M6x16-B-M6	260	1700	450	3260	220	1580	-	5	>5
423041	CFD.66 B-M6-p-M6x16	260	1700	450	3260	220	1580	-	5	>5
423051	CFD.66 CH-6-B-M6	410	2610	430	3660	310	2830	5	5	-
423061	CFD.66 CH-6-p-M6x16	280	1770	350	3090	180	1610	5	-	>5