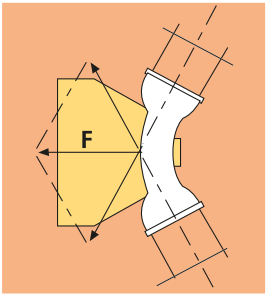
Anchor blocks



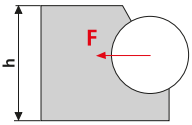
The contractor is responsible for analyzing and eliminating any risks during installation (especially the use of personal protective equipment).
All the values contained in this document are provided by SAINT-GOBAIN PAM for guidance only. They are no substitute for carrying out prior studies or enlisting the services of a consultant.

1 CONSTRUCTION RECOMMENDATIONS

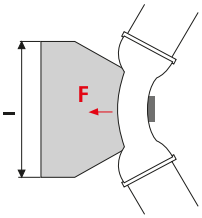
The concrete anchor blocks presented hereinafter have been designed for the most frequently encountered types of soil and laying conditions.

If the laying conditions are not covered by the following tables, contact SAINT-GOBAIN PAM.

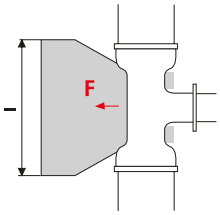
It is important to cast the concrete **directly against the surrounding soil** and use a concrete mix offering adequate strength.



When designing the anchor blocks, do not forget to leave the **gaskets exposed** for inspection during subsequent hydraulic testing.



Caution! Never excavate in the immediate vicinity of an anchor block restraining thrust without having taken the precaution of sufficiently reducing the pressure in the main during work.



Anchor blocks

2 ANCHOR BLOCK DIMENSIONS

Soil with HIGH mechanical strength

- Internal friction: $\phi = 40°$
- Soil strength: $\sigma = 0.6$ daN/cm²
- Mass density: $\gamma = 2$ t/m³
- Height of cover: **H = 1 m**
- No groundwater

Soil with high mechanical strength						
DN	Test pressure	1/32 bend w x h / V	1/16 bend w x h / V	1/8 bend w x h / V	1/4 bend w x h / V	Blank flange and tee w x h / V
	bar	m x m /m³	m x m /m³	m x m /m³	m x m /m³	m x m /m³
60	10	0.07x0.16/0.01	0.14x0.16/0.02	0.17x0.26/0.02	0.31x0.26/0.04	0.22x0.26/0.03
	16	0.11x0.16/0.02	0.14x0.26/0.02	0.27x0.26/0.04	0.48x0.26/0.07	0.35x0.26/0.04
	25	0.17x0.16/0.03	0.22x0.26/0.03	0.41x0.26/0.05	0.71x0.26/0.14	0.52x0.26/0.08
80	10	0.1x0.18/0.02	0.20x0.18/0.04	0.25x0.28/0.04	0.45x0.28/0.07	0.33x0.28/0.05
	16	0.16x0.18/0.03	0.21x0.28/0.03	0.39x0.28/0.06	0.68x0.28/0.14	0.50x0.28/0.08
	25	0.17x0.28/0.02	0.32x0.28/0.04	0.59x0.28/0.11	1.00x0.28/0.31	0.74x0.28/0.17
100	10	0.13x0.20/0.03	0.18x0.30/0.03	0.33x0.30/0.05	0.58x0.30/0.11	0.43x0.30/0.07
	16	0.20x0.20/0.05	0.28x0.30/0.05	0.51x0.30/0.1	0.88x0.30/0.25	0.65x0.30/0.14
	25	0.22x0.30/0.04	0.42x0.30/0.07	0.76x0.30/0.19	1.03x0.40/0.47	0.95x0.30/0.30
125	10	0.17x0.22/0.04	0.24x0.33/0.05	0.44x0.33/0.09	0.76x0.33/0.21	0.56x0.33/0.13
	16	0.19x0.33/0.04	0.37x0.33/0.07	0.67x0.33/0.16	0.94x0.43/0.41	0.85x0.33/0.26
	25	0.29x0.33/0.06	0.55x0.33/0.12	0.99x0.33/0.35	1.35x0.43/0.85	1.02x0.43/0.49
150	10	0.21x0.25/0.06	0.3x0.35/0.07	0.55x0.35/0.14	0.79x0.45/0.31	0.70x0.35/0.19
	16	0.24x0.35/0.05	0.46x0.35/0.11	0.83x0.35/0.27	1.17x0.45/0.67	0.88x0.45/0.38
	25	0.37x0.35/0.09	0.69x0.35/0.19	1.02x0.45/0.51	1.66x0.45/1.37	1.27x0.45/0.79
200	10	0.28x0.30/0.10	0.42x0.40/0.14	0.66x0.50/0.24	1.11x0.50/0.68	0.83x0.50/0.38
	16	0.35x0.40/0.11	0.65x0.40/0.22	0.99x0.50/0.53	1.44x0.60/1.37	1.23x0.50/0.83
	25	0.52x0.40/0.16	0.81x0.50/0.36	1.42x0.50/1.11	2.03x0.60/2.72	1.56x0.60/1.61
250	10	0.35x0.35/0.16	0.55x0.45/0.22	0.86x0.55/0.45	1.28x0.65/1.18	1.08x0.55/0.7
	16	0.45x0.45/0.18	0.72x0.55/0.31	1.27x0.55/0.98	1.71x0.75/2.4	1.42x0.65/1.43
	25	0.58x0.55/0.20	1.05x0.55/0.67	1.63x0.65/1.90	2.22x0.85/4.61	1.84x0.75/2.79
300	10	0.42x0.40/0.24	0.59x0.60/0.23	1.05x0.60/0.73	1.57x0.70/1.90	1.19x0.70/1.09
	16	0.55x0.50/0.29	0.89x0.60/0.52	1.40x0.70/1.52	1.96x0.90/3.79	1.60x0.80/2.26
	25	0.72x0.60/0.34	1.17x0.70/1.05	1.84x0.80/2.97	2.45x1.10/7.28	2.10x0.90/4.39
350	10	0.49x0.45/0.33	0.70x0.65/0.35	1.14x0.75/1.06	1.72x0.85/2.78	1.31x0.85/1.61
	16	0.58x0.65/0.24	0.96x0.75/0.76	1.54x0.85/2.22	2.20x1.05/5.58	1.78x0.95/3.33
	25	0.85x0.65/0.52	1.38x0.75/1.58	2.04x0.95/4.35	2.70x1.35/10.86	2.27x1.15/6.49
400	10	0.55x0.50/0.43	0.74x0.80/0.48	1.22x0.90/1.48	1.79x1.10/3.86	1.51x0.90/2.27
	16	0.66x0.70/0.38	1.10x0.90/1.07	1.68x1.00/3.09	2.28x1.40/8.01	1.96x1.10/4.64
	25	0.90x0.80/0.72	1.48x0.90/2.18	2.02x1.40/6.31	3.09x1.40/14.74	2.44x1.40/9.20

Anchor blocks

Soil with MEDIUM mechanical strength

- Internal friction: $\phi = 30°$
- Soil strength: $\sigma = 0.6$ daN/cm²
- Mass density: $\gamma = 2$ t/m³
- Height of cover: **H = 1 m**
- No groundwater

Soil with medium mechanical strength						
DN	Test pressure	1/32 bend w x h / V	1/16 bend w x h / V	1/8 bend w x h / V	1/4 bend w x h / V	Blank flange and tee w x h / V
	bar	m x m /m³	m x m /m³	m x m /m³	m x m /m³	m x m /m³
60	10	0.11x0.16/0.01	0.14x0.26/0.01	0.26x0.26/0.03	0.46x0.26/0.06	0.33x0.26/0.03
	16	0.17x0.16/0.02	0.21x0.26/0.02	0.40x0.26/0.05	0.69x0.26/0.14	0.51x0.26/0.07
	25	0.17x0.26/0.02	0.33x0.26/0.03	0.60x0.26/0.10	1.01x0.26/0.29	0.75x0.26/0.16
80	10	0.15x0.18/0.02	0.20x0.28/0.02	0.38x0.28/0.05	0.65x0.28/0.13	0.48x0.28/0.07
	16	0.16x0.28/0.02	0.31x0.28/0.04	0.57x0.28/0.10	0.97x0.28/0.29	0.73x0.28/0.16
	25	0.25x0.28/0.03	0.47x0.28/0.07	0.84x0.28/0.22	1.13x0.38/0.53	1.06x0.28/0.34
100	10	0.19x0.20/0.04	0.26x0.30/0.04	0.49x0.30/0.08	0.84x0.30/0.23	0.62x0.30/0.13
	16	0.21x0.30/0.03	0.41x0.30/0.06	0.74x0.30/0.18	1.01x0.40/0.45	0.93x0.30/0.29
	25	0.33x0.30/0.05	0.61x0.30/0.12	1.08x0.30/0.38	1.44x0.40/0.92	1.10x0.40/0.53
125	10	0.18x0.33/0.03	0.35x0.33/0.06	0.64x0.33/0.15	0.90x0.43/0.38	0.81x0.33/0.24
	16	0.29x0.33/0.05	0.54x0.33/0.10	0.96x0.33/0.33	1.32x0.43/0.81	0.99x0.43/0.46
	25	0.43x0.33/0.07	0.80x0.33/0.23	1.15x0.43/0.62	1.86x0.43/1.61	1.42x0.43/0.95
150	10	0.23x0.35/0.04	0.44x0.35/0.09	0.80x0.35/0.25	1.12x0.45/0.62	0.84x0.45/0.35
	16	0.36x0.35/0.07	0.67x0.35/0.17	0.99x0.45/0.49	1.62x0.45/1.30	1.23x0.45/0.75
	25	0.54x0.35/0.11	0.82x0.45/0.33	1.42x0.45/1	2.00x0.55/2.41	1.54x0.55/1.43
200	10	0.33x0.40/0.08	0.62x0.40/0.17	0.94x0.50/0.49	1.38x0.60/1.26	1.18x0.50/0.76
	16	0.51x0.40/0.13	0.79x0.50/0.35	1.38x0.50/1.05	1.97x0.60/2.57	1.52x0.60/1.52
	25	0.64x0.50/0.23	1.15x0.50/0.73	1.74x0.60/2.00	2.32x0.80/4.74	1.94x0.70/2.91
250	10	0.43x0.45/0.14	0.69x0.55/0.29	1.09x0.65/0.85	1.63x0.75/2.19	1.35x0.65/1.31
	16	0.57x0.55/0.20	1.03x0.55/0.64	1.59x0.65/1.80	2.16x0.85/4.35	1.79x0.75/2.64
	25	0.84x0.55/0.43	1.33x0.65/1.26	2.04x0.75/3.44	2.66x1.05/8.18	2.32x0.85/5.02
300	10	0.53x0.50/0.22	0.85x0.60/0.48	1.34x0.70/1.39	1.87x0.90/3.46	1.53x0.80/2.06
	16	0.70x0.60/0.33	1.14x0.70/1.00	1.79x0.80/2.81	2.38x1.10/6.86	2.05x0.90/4.15
	25	1.03x0.60/0.70	1.50x0.80/1.99	2.21x1.00/5.37	3.01x1.30/12.92	2.38x1.30/8.13
350	10	0.55x0.65/0.22	0.92x0.75/0.69	1.47x0.85/2.03	2.10x1.05/5.09	1.71x0.95/3.04
	16	0.83x0.65/0.50	1.25x0.85/1.47	1.89x1.05/4.13	2.62x1.35/10.22	2.13x1.25/6.22
	25	1.11x0.75/1.01	1.67x0.95/2.93	2.34x1.35/8.13	3.52x1.35/18.40	2.81x1.35/11.69
400	10	0.64x0.70/0.31	1.06x0.80/0.98	1.60x1.00/2.82	2.18x1.40/7.31	1.87x1.10/4.24
	16	0.88x0.80/0.68	1.44x0.90/2.07	1.97x1.40/5.96	3.00x1.40/13.87	2.37x1.40/8.68
	25	1.19x0.90/1.41	1.84x1.10/4.09	2.68x1.40/11.08	4.01x1.40/24.73	3.21x1.40/15.82

Anchor blocks

3 HYDRAULIC THRUST

Thrust F = test P x f (1 bar)

Example: 45° bend
DN = 150
Test P = 10 bar

Thrust F = 1740 DaN

Thrust f for pressure of 1 bar

DN	Tee or blank flange (daN)	1/4 bend (daN)	1/8 bend (daN)	1/16 bend (daN)	1/32 bend (daN)
60	47	66	36	18	9
80	75	107	58	29	15
100	109	155	84	43	21
125	163	230	15	63	32
150	227	321	174	89	44
200	387	547	296	151	76
250	590	834	451	230	116
300	835	1180	639	326	164
350	1122	1587	859	438	220
400	1445	2044	1106	564	283

4 SOIL CHARACTERISTICS

The values below are those generally accepted for soil characterization. They are no substitute for actual site or laboratory measurements.

Soil type	Dry / wet		Submerged	
	ϕ	γ	ϕ	γ
	degrees	t/m^3	degrees	t/m^3
Fragmented rock	40	2	35	1.1
Gravel, sands	35	1.9	30	1.1
Gravel, sands Silts / clays	30	2	25	1.1
Silts / clays	25	1.9	15	1.1
Humus Organic clays / silts	15	1.5	no mean characteristics	

ϕ: *soil internal friction angle*
γ: *soil density*
(standard geotechnical data)