Supplementary table 1 Original diffuser geometrical parameters

Geometrical parameters	Symbols	Values
Inlet inner diameter	D_3	154 mm
Inlet outer diameter	D_4	193 mm
Outlet inner diameter	D_5	55.2 mm
Outlet outer diameter	D_6	109.8 mm
Blade inlet angle	α_{3n}	30°
Blade inlet width	b_3	45 mm
Blade axial length	L_d	80 mm
Blade number	z	7
Blade outlet angle	β_3	90°
Blade wrap angle	ϕ_3	85°

Supplementary table 2 Level values of four factors

Scheme	Blade inlet angle (α_{3n} in °)
1	24
2	27
3	30
4	33
5	36

Supplementary table 3 Grid independence analysis

Grids size	Grid number (million)	Water head (m)	Efficiency (%)
1.4	0.58	16.30	78.12
1.2	0.69	16.59	79.35
1.0	0.81	16.75	80.27
0.8	1.23	17.06	81.06
0.6	1.85	17.08	81.11