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TECHNICAL INFORMATION DIMENSIONAL TOLERANCES

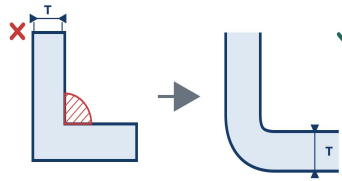
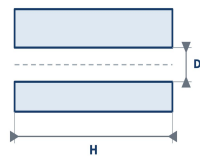
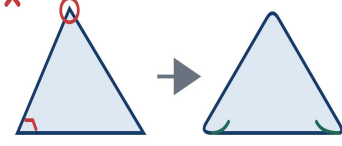
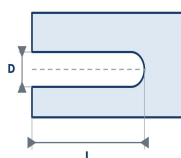
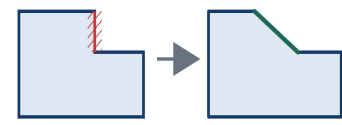
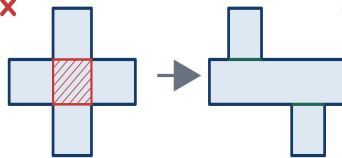
Linear Tolerances for Steel Investment Castings

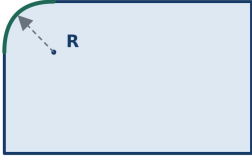
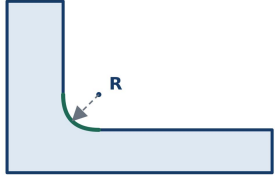
Reference: VDG/BDG Reference Sheet P 690

All dimensions are in millimetres unless otherwise specified.

Nominal Dimension Range (mm)		Length, Width and Height						Centerline Dimensions	
		D1		D2		D3		D1	D2
Over	Up to and Including	Tolerance	Tolerance Range	Tolerance	Tolerance Range	Tolerance	Tolerance Range	Tolerance	Tolerance
0	6	±0.10	0.20	±0.08	0.16	±0.06	0.12	±0.25	±0.16
6	10	±0.12	0.24	±0.10	0.20				
10	14	±0.15	0.30	±0.12	0.24	±0.09	0.18		
14	18	±0.2	0.40	±0.14	0.28				
18	24	±0.25	0.50	±0.17	0.34	±0.12	0.24	±0.32	±0.20
24	30	±0.30	0.60	±0.20	0.40	±0.14	0.28		
30	40	±0.37	0.74	±0.25	0.50	±0.17	0.34	±0.50	±0.30
40	50	±0.44	0.88	±0.30	0.60	±0.20	0.40		
50	65	±0.52	1.04	±0.38	0.76	±0.23	0.46	±0.71	±0.45
65	80	±0.60	1.20	±0.46	0.92	±0.27	0.54		
80	100	±0.68	1.36	±0.53	1.06	±0.30	0.60	±0.91	±0.60
100	120	±0.76	1.52	±0.60	1.20	±0.33	0.66		
120	140	±0.84	1.68	±0.65	1.30	±0.36	0.72	±1.15	±0.85
140	160	±0.92	1.84	±0.72	1.44	±0.38	0.76		
160	180	±1.02	2.04	±0.80	1.60	±0.42	0.84		
180	200	±1.12	2.24	±0.88	1.76	±0.43	0.86	±1.80	±1.00
200	225	±1.28	2.56	±0.95	1.90	±0.47	0.94		
225	250	±1.44	2.88	±1.05	2.10	±0.51	1.02		
250	280	±1.64	3.28	±1.15	2.30	±0.56	1.12	±2.20	±1.25
280	315	±1.84	3.68	±1.25	2.50	±0.63	1.26		
315	355	±2.10	4.20	±1.40	2.80	±0.71	1.42	±2.60	±1.60
355	400	±2.40	4.80	±1.60	3.20	±0.80	1.60		

Tolerance Grade Notes D1 – General Dimensional Tolerances Applicable to general dimensions. D2 – Tighter Dimensional Tolerances Applicable to critical or functional dimensions, subject to engineering review. D3 – Precision Dimensional Tolerances Applicable only to selected dimensions. Additional operations and costs may be required and must be agreed upon before production.	
Typical Angular Tolerance	Typical Straightness Tolerance
$\pm 0.5^\circ$ to $\pm 1.0^\circ$	≤ 0.13 mm per 25 mm of length (0.005 in/in)
Actual tolerance capability depends on the alloy, part size, geometry, tooling design and inspection method.	

INVESTMENT CASTING DESIGN GUIDELINES				
Cast Hole Depth Guidelines			General Geometry Recommendations	
Through Holes			1. Uniform Wall Thickness Avoid isolated heavy sections.	
Hole Diameter (D)	Maximum Length (H)			
2 mm ≤ D ≤ 7 mm	H ≤ 2D			
7 mm < D ≤ 13	H ≤ 3D			
D > 13 mm	H ≤ 4D			
Blind Holes			2. Rounded Corners and Fillets Replace sharp edges with suitable radii.	
Hole Diameter (D)	Maximum Depth (L)			
2 mm ≤ D ≤ 7 mm	L ≤ D			
7 mm < D ≤ 13 mm	L ≤ 1.5D			
D > 13 mm	L ≤ 2D			
D = Hole diameter H = Through-hole length L = Blind-hole depth Minimum cast hole diameter: 2 mm			3. Gradual Thickness Transitions Avoid abrupt changes in wall thickness.	
			4. Staggered Rib Intersections Reduce localized material buildup.	
Ceramic Core Option: Deeper or more complex internal holes may be produced using preformed ceramic cores. Additional tooling and processing costs may apply, making this solution more economical for larger production quantities.				

Typical Casting Capabilities		
Minimum Wall Thickness	Typically 2 mm; down to 1 mm in small localized areas, subject to engineering review.	
Corner and Fillet Radii	External corner radius	Internal fillet radius
		
	$R \geq 0.3 \text{ mm}$	$R \geq 0.5 \text{ mm}$
As-Cast Surface Roughness	Typical as-cast surface roughness: Ra 3.2–6.3 μm	
Casting Weight Range	Typical casting weight range: 5 g–80 kg	