TOOL STEEL – GRADES AND SPECIFICATIONS

OVERVIEW OF TOOL STEEL

Tool steel is a high performance alloy steel, which is specifically engineered for the manufacture of cutting tools, dies, moulds, punches, machine tooling and wear resistant components, by combining carefully controlled mixtures of carbon with alloying elements such as chromium, molybdenum, vanadium, tungsten, manganese and silicon, tool steel delivers exceptional hardness, wear resistance, toughness, dimensional stability and heat resistance.

Unlike conventional engineering steels, tool steels are designed to retain their hardness and strength even at elevated temperatures, making it ideal for demanding industrial applications such as metal forming, cutting and manufacturing. Following appropriate heat treatment, tool steels achieve excellent edge retention, compressive strength and resistance to deformation, making them suitable for precision tooling and long production runs.

Tool steel is extensively used throughout the tooling, aerospace, automotive, defence, plastics, oil and gas, construction and manufacturing industries, supporting high-volume and precision engineering industries where reliable performance and extended service life are essential.

Chargentum supplies premium quality Ground Flat Stock Tool Steel together with EN1.2210, D2 and F520 Tool Steel Round Bars in a comprehensive range of sizes for customers across the UK. Materials are supplied with full mill certification and are suitable for machining, heat treatment and precision engineering applications.

TOOL STEEL TYPES

Product	Grade/Alloy	Tool Steel Type	Typical Applications
Ground Flat Stock Tool Steel – 500mm	Various Tool Steel Grades	Precision Ground Tool Steel	Dies, Jigs, Fixtures, Gauges, Components, General Engineering
EN1.2210 Steel Round Bar	DIN 1.2344	Hot Work Tool Steel	Die Casting Dies, Extrusion Dies, Forging Dies, Hot Shear Blades
D2 Tool Steel Round Bar	DIN 1.2379	High Carbon High Chromium Cold Work Tool Steel	Blanking Dies, Punches, Industrial Knives, Wear Parts
F520 Tool Steel Round Bar	DIN 1.2510	Oil Hardening Cold Work Tool Steel	Cutting Tools, Gauges, Bushes, Punches, Precision Tools
P20 Tool Steel Round Bar	DIN 1.2311	Plastic Mould Tool Steel	Injection Moulds, Plastic Dies, Blow Moulds, Tooling Plates

Notes:

- Available with full mill test certification (EN 10204 3.1).
- Precision ground and machined tolerances.
- High dimensional stability after heat treatment.
- Suitable for machining, grinding and polishing.
- Grades available for both hot work and cold work tooling.
- Excellent toughness and edge retention.
- Good resistance to thermal fatigue and heat checking (H13).
- Nationwide UK delivery.

STANDARD GRADES

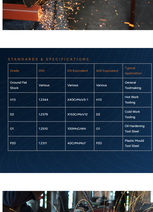
Chargentum supplies the UK's most widely specified Tool Steel grades for precision machining, mould tooling, die manufacture, metal forming and general engineering applications.

Grade	DIN Designation	Typical Hardness (HRC)	Primary Applications
Ground Flat Stock Tool Steel	Various	Supplied Annealed	General Toolmaking Jigs & Fixtures
H13	DIN 1.2344	44-52 HRC	Hot Work Dies, Forging, & Die Casting
D2	DIN 1.2379	58-62 HRC	Cold Work Dies, Knives, Punches
O1	DIN 1.2510	57-62 HRC	Precision Cutting Tools & Gauges
P20	DIN 1.2311	28-36 HRC (Pre-Hardened)	Plastic Injection Moulds & Tooling

*Typical hardness after appropriate heat treatment unless supplied pre-hardened.

CHEMICAL COMPOSITION (TYPICAL % BY MASS)

Element	H13 (1.2344)	D2 (1.2379)	O1 (1.2510)	P20 (1.2311)	Function
Carbon (C)	0.37–0.42	1.40–1.60	0.85–1.00	0.28–0.40	Hardness & Strength
Silicon (Si)	0.80–1.20	0.10–0.60	0.10–0.40	0.20–0.40	Deoxidation
Manganese (Mn)	0.25–0.50	0.20–0.80	1.00–1.40	1.30–1.60	Toughness
Chromium (Cr)	4.80–5.50	11.00–13.00	0.40–0.70	1.90–2.10	Wear & Corrosion Resistance
Molybdenum (Mo)	1.20–1.50	0.70–1.20	Trace	0.15–0.30	Hardenability
Vanadium (V)	0.80–1.20	0.25–1.10	0.10–0.25	—	Grain Refinement & Wear Resistance
Nickel (Ni)	—	—	Up to 0.30	—	Toughness
Sulphur (S)	<0.03	<0.03	<0.03	<0.03	Controlled Residual
Phosphorus (P)	<0.03	<0.03	<0.03	<0.03	Controlled Residual

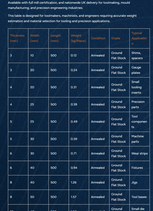


MECHANICAL PROPERTIES

Property	H13	D2	O1	P20	Notes
Hardness	44–52 HRC	58–62 HRC	57–62 HRC	28–36 HRC	Typical Supply/Final Treated Condition
Density	7,800–7,850 kg/m³	7,700 kg/m³	7,850 kg/m³	7,850 kg/m³	Typical
Modulus of Elasticity	210,000 MPa	210,000 MPa	210,000 MPa	210,000 MPa	Axial or Stiffness
Thermal Conductivity	24–28 W/mK	20–25 W/mK	36–42 W/mK	29–32 W/mK	Approximate
Compressive Strength	Excellent	Excellent	Very Good	Good	Tooling Performance
Wear Resistance	Very Good	Excellent	Excellent	Good	Service Life
Toughness	Excellent	Good	Very Good	Excellent	Impact Resistance

DELIVERY CONDITIONS

Condition	Description
Annealed	Standard machining condition
Pre-Hardened	Supplied for HRC Tool Steel
Hot Rolled	Mill finish available
Peeled	Improved dimensional accuracy
Turned	Polished finish
Ground	Precision ground finish
Precision Ground	Tight tolerance applications
Full Cut Stock	Available on request
Ultrasonically Tested	Available for critical applications

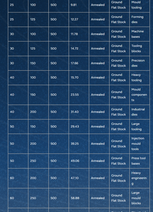


PHYSICAL PROPERTIES

Property	Value	Notes
Density	7,700–7,850 kg/m³	Depending on grade
Modulus of Elasticity	210,000 MPa	Typical
Thermal Expansion	10.5–12.5 ×10⁻⁶ /°C	Approximate
Thermal Conductivity	20–42 W/mK	Grade dependent
Electrical Conductivity	3–10% IACS	Approximate
Melting Range	1,370–1,480 °C	Grade dependent

STANDARDS & SPECIFICATIONS

Grade	DIN	Chargentum	AISI Equivalent	Typical Applications
Ground Flat Stock	Various	Various	Various	General Toolmaking
H13	1.2344	X40CrMoV5-1	H13	Hot Work Tooling
D2	1.2379	X153CrMoV12	D2	Cold Work Tooling
O1	1.2510	100MnCrW4	O1	Oil Hardening Cold Work
P20	1.2311	40CrMnMoS7	P20	Plastic Mould Tool Steel



HEAT TREATMENT INFORMATION

Process	H13	D2	O1	P20	Purpose
Annealing	840–870°C	850–900°C	760–790°C	710–760°C	Improve Machinability
Stress Relieving	600–650°C	600–650°C	650°C	550–600°C	Reduce Residual Stress
Hardening	1,010–1,030°C	1,020–1,040°C	780–820°C	Usually Supplied Pre-Hardened	Increase Hardness
Quenching	Air	Air/Oil	Oil	—	Controlled Cooling
Tempering	540–650°C	150–570°C	150–300°C	500–600°C (if Requested)	Improve Toughness & Stability

This technical data provides a general engineering guide. Actual properties may vary depending on the manufacturing process, heat treatment condition and application requirements. Full mill certification and material test reports are available upon request with all Chargentum Tool Steel products.

METAL TYPES & APPLICATIONS

GROUND FLAT STOCK TOOL STEEL – 500MM

Ground Flat Stock Tool Steel is supplied in precision ground rectangular stock with consistent thickness and width tolerances. All sizes below are based on standard 500mm lengths and calculated using typical tool steel density (7,850 kg/m³).

Chargentum supplies precision Ground Flat Stock Tool Steel in a wide range of thicknesses and widths, all manufactured to strict dimensional tolerances for high performance toolmaking and precision engineering applications.

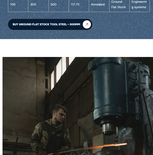
All material is supplied in standard 500mm lengths with precision ground surfaces, ensuring excellent machinability, stability, and accurate during fabrication.

Available with full mill certification, and nationwide UK delivery for toolmaking, mould manufacturing, and precision engineering industries.

This table is designed for toolmakers, machinists, and engineers requiring accurate weight estimation and material selection for tooling and precision applications.

Thickness (mm)	Width (mm)	Length (mm)	Weight (kg/25mm)	Condition	Grade	Typical Applications
2	10	500	0.12	Annealed	Ground Flat Stock	Shims, Spacers
3	25	500	0.24	Annealed	Ground Flat Stock	Gauge Blocks
4	20	500	0.31	Annealed	Ground Flat Stock	Small Jigs, Fixtures
4	25	500	0.39	Annealed	Ground Flat Stock	Precision parts
5	25	500	0.49	Annealed	Ground Flat Stock	Tool holders
6	10	500	0.29	Annealed	Ground Flat Stock	Wear strips
6	20	500	0.59	Annealed	Ground Flat Stock	Fixtures
8	25	500	1.96	Annealed	Ground Flat Stock	Jigs
10	10	500	1.57	Annealed	Ground Flat Stock	Tool bases
10	20	500	3.14	Annealed	Ground Flat Stock	Small die blocks
10	25	500	3.93	Annealed	Ground Flat Stock	Fixtures
12	20	500	3.77	Annealed	Ground Flat Stock	Machine bases
12	25	500	4.71	Annealed	Ground Flat Stock	Tool holders
15	25	500	5.89	Annealed	Ground Flat Stock	Press tools
20	25	500	7.85	Annealed	Ground Flat Stock	Die components
25	25	500	9.81	Annealed	Ground Flat Stock	Die setts
25	50	500	19.63	Annealed	Ground Flat Stock	Tool plates
25	100	500	39.25	Annealed	Ground Flat Stock	Mould tooling
25	125	500	49.06	Annealed	Ground Flat Stock	Forming dies
30	100	500	47.10	Annealed	Ground Flat Stock	Machine bases
30	125	500	58.88	Annealed	Ground Flat Stock	Tooling blocks
30	150	500	70.65	Annealed	Ground Flat Stock	Heavy dies
40	100	500	62.83	Annealed	Ground Flat Stock	Heavy tooling
40	150	500	94.25	Annealed	Ground Flat Stock	Mould components
40	200	500	125.66	Annealed	Ground Flat Stock	Industrial dies
50	150	500	117.80	Annealed	Ground Flat Stock	Large tooling
50	200	500	157.08	Annealed	Ground Flat Stock	Injection mould tools
50	250	500	196.35	Annealed	Ground Flat Stock	Press tool bases
60	250	500	235.62	Annealed	Ground Flat Stock	Heavy engineering
60	300	500	282.74	Annealed	Ground Flat Stock	Large mould tools
70	300	500	329.86	Annealed	Ground Flat Stock	Structural tooling
75	300	500	353.42	Annealed	Ground Flat Stock	Heavy dies
80	300	500	376.99	Annealed	Ground Flat Stock	Industrial tooling
100	300	500	471.24	Annealed	Ground Flat Stock	Large machine components
100	400	500	628.32	Annealed	Ground Flat Stock	Heavy industrial tooling
100	500	500	785.40	Annealed	Ground Flat Stock	Engineering & precision

BUY GROUND FLAT STOCK TOOL STEEL – 500MM



H13 TOOL STEEL ROUND BARS – DIN 1.2344

H13 Tool Steel (DIN 1.2344) is a high-performance hot work tool steel designed for applications involving extreme heat, thermal shock and continuous mechanical stress. It is widely used in die casting, forging, extrusion and plastic moulding tools, where it delivers up to its excellent combination of hot hardness, toughness and resistance to thermal fatigue.

This chromium-molybdenum-vanadium alloy steel maintains strength at elevated temperatures, making it ideal for tooling exposed to repeated heating and cooling cycles. H13 is one of the most widely used hot work tool steels in demanding industrial environments where tool life and reliability are critical.

Chargentum supplies premium H13 Tool Steel Round Bars across the UK in a full range of diameters for work holding, die casting and forging applications. All material supplied in annealed condition for machining and heat treatment. Nationwide UK delivery, supplied with full certification, ensuring traceability and compliance with engineering specifications.

Diameter (mm)	Weight (kg/m)	Length (mm)	Condition	Grade	Typical Applications
20	2.47	3000–6000	Annealed	H13 (1.2344)	Small punches, inserts

25	3.85	3000-6000	Annealed	H13 (1.2344)	Tool inserts
30	5.55	3000-6000	Annealed	H13 (1.2344)	Die components
35	7.55	3000-6000	Annealed	H13 (1.2344)	Precision tooling
40	9.87	3000-6000	Annealed	H13 (1.2344)	Punches
45	12.49	3000-6000	Annealed	H13 (1.2344)	Hot work tools
50	15.42	3000-6000	Annealed	H13 (1.2344)	Forging dies
60	22.20	3000-6000	Annealed	H13 (1.2344)	Extrusion tooling
70	30.21	3000-6000	Annealed	H13 (1.2344)	Heavy tooling
80	39.46	3000-6000	Annealed	H13 (1.2344)	Industrial dies
90	49.94	3000-6000	Annealed	H13 (1.2344)	Die casting systems
100	61.65	3000-6000	Annealed	H13 (1.2344)	Heavy engineering tools
125	96.33	3000-6000	Annealed	H13 (1.2344)	Large die components
150	138.72	3000-6000	Annealed	H13 (1.2344)	High-temperature tooling
200	246.60	3000-6000	Annealed	H13 (1.2344)	Heavy-duty tooling

BUY H13 TOOL STEEL ROUND BAR – DIN 1.2344

D2 TOOL STEEL ROUND BARS – DIN 1.2379

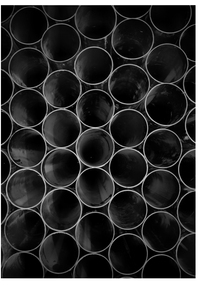
D2 Tool Steel (DIN 1.2379) is a high-carbon, high-chromium cold work tool steel designed for exceptional wear resistance, high hardness and superior edge retention. It is widely used in industrial tooling applications where prolonged service life and resistance to abrasion are critical.

Due to its high chromium content, D2 offers excellent resistance to wear and deformation, making it ideal for blanking dies, cutting tools, forming tools and precision industrial components. It is an air-hardening steel, providing good dimensional stability during heat treatment and reducing distortion compared to oil-quenched grades.

Chargentum supplies premium D2 Tool Steel Round Bars across the UK in a full range of diameters for cold work tooling, cutting tools and high-wear industrial applications, supplied in annealed condition for machining, with full mill certification and traceability, ensuring consistent quality and compliance with UK engineering standards.

Diameter (mm)	Weight (kg/m)	Length (mm)	Condition	Grade	Typical Applications
20	2.47	3000-6000	Annealed	D2 (1.2379)	Small punches
25	3.85	3000-6000	Annealed	D2 (1.2379)	Cutting tools inserts
30	5.55	3000-6000	Annealed	D2 (1.2379)	Precision dies
35	7.55	3000-6000	Annealed	D2 (1.2379)	Tool components
40	9.87	3000-6000	Annealed	D2 (1.2379)	Blanking dies
45	12.49	3000-6000	Annealed	D2 (1.2379)	Industrial knives
50	15.42	3000-6000	Annealed	D2 (1.2379)	Punch tools
55	18.66	3000-6000	Annealed	D2 (1.2379)	Wear parts
60	22.20	3000-6000	Annealed	D2 (1.2379)	Forming dies
65	26.05	3000-6000	Annealed	D2 (1.2379)	Slitting blades
70	30.21	3000-6000	Annealed	D2 (1.2379)	Heavy cutting tools
75	34.69	3000-6000	Annealed	D2 (1.2379)	Industrial tooling
80	39.46	3000-6000	Annealed	D2 (1.2379)	Wear-resistant parts
85	44.55	3000-6000	Annealed	D2 (1.2379)	Machine knives
90	49.94	3000-6000	Annealed	D2 (1.2379)	Tool systems
100	61.65	3000-6000	Annealed	D2 (1.2379)	Heavy-duty dies
110	74.59	3000-6000	Annealed	D2 (1.2379)	Industrial systems
125	96.33	3000-6000	Annealed	D2 (1.2379)	Large tooling blocks
140	120.87	3000-6000	Annealed	D2 (1.2379)	Press tools
150	138.72	3000-6000	Annealed	D2 (1.2379)	High-wear systems
160	157.83	3000-6000	Annealed	D2 (1.2379)	Heavy engineering tools
180	199.78	3000-6000	Annealed	D2 (1.2379)	Industrial dies
200	246.60	3000-6000	Annealed	D2 (1.2379)	Large tooling systems
220	298.39	3000-6000	Annealed	D2 (1.2379)	Heavy duty components
250	385.31	3000-6000	Annealed	D2 (1.2379)	Large industrial tooling
300	554.85	3000-6000	Annealed	D2 (1.2379)	Forged tooling blocks

BUY D2 TOOL STEEL ROUND BAR – DIN 1.2379



O1 TOOL STEEL ROUND BARS – DIN 1.2510

O1 Tool Steel (DIN 1.2510) is an oil-hardening cold work tool steel known for its excellent machinability, good dimensional stability during heat treatment and strong wear resistance. It is widely used in precision tooling applications where accuracy, edge retention and controlled hardness are essential.

Compared to high-chromium steels like D2, O1 offers easier machining and better control during heat treatment, making it ideal for toolmakers producing gauges, cutting tools, punches and precision engineering components. Its oil quenching process helps minimise distortion and cracking, making it suitable for complex tooling shapes.

Chargentum supplies premium O1 Tool Steel Round Bars across the UK in a full range of diameters suitable for precision tooling, cutting tools and engineering applications, supplied in annealed condition for machining, with full mill certification and traceability to ensure consistent performance and compliance with UK engineering standards.

Diameter (mm)	Weight (kg/m)	Length (mm)	Condition	Grade	Typical Application
20	2.47	3000-6000	Annealed	O1 (1.2510)	Small punches
25	3.85	3000-6000	Annealed	O1 (1.2510)	Cutting tools
30	5.55	3000-6000	Annealed	O1 (1.2510)	Precision dies
35	7.55	3000-6000	Annealed	O1 (1.2510)	Tool inserts
40	9.87	3000-6000	Annealed	O1 (1.2510)	Gauge components
45	12.49	3000-6000	Annealed	O1 (1.2510)	Machine tooling
50	15.42	3000-6000	Annealed	O1 (1.2510)	Punch tools
55	18.66	3000-6000	Annealed	O1 (1.2510)	Precision gauges
60	22.20	3000-6000	Annealed	O1 (1.2510)	Cutting dies
65	26.05	3000-6000	Annealed	O1 (1.2510)	Industrial tooling
70	30.21	3000-6000	Annealed	O1 (1.2510)	Heavy tools
75	34.69	3000-6000	Annealed	O1 (1.2510)	Engineering components
80	39.46	3000-6000	Annealed	O1 (1.2510)	Wear parts
85	44.55	3000-6000	Annealed	O1 (1.2510)	Tool systems
90	49.94	3000-6000	Annealed	O1 (1.2510)	Precision tooling
100	61.65	3000-6000	Annealed	O1 (1.2510)	Heavy-duty tools
110	74.59	3000-6000	Annealed	O1 (1.2510)	Industrial systems
125	96.33	3000-6000	Annealed	O1 (1.2510)	Large tooling blocks
140	120.87	3000-6000	Annealed	O1 (1.2510)	Press tooling
150	138.72	3000-6000	Annealed	O1 (1.2510)	Heavy engineering tools
160	157.83	3000-6000	Annealed	O1 (1.2510)	Tooling systems
180	199.78	3000-6000	Annealed	O1 (1.2510)	Large dies
200	246.60	3000-6000	Annealed	O1 (1.2510)	Industrial tooling
220	298.39	3000-6000	Annealed	O1 (1.2510)	Heavy components
250	385.31	3000-6000	Annealed	O1 (1.2510)	Large industrial tooling

BUY O1 TOOL STEEL ROUND BAR – DIN 1.2510

P20 TOOL STEEL ROUND BARS – DIN 1.2311

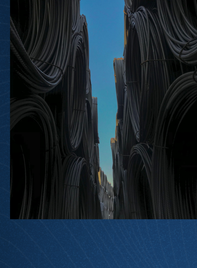
P20 Tool Steel (DIN 1.2311) is a low alloy mould steel widely used for plastic injection moulds, die casting mould bases and precision tooling applications. It is supplied in a pre-hardened condition, offering a balanced combination of machinability, toughness and moderate wear resistance without requiring additional heat treatment in most applications.

P20 is one of the most commonly used mould steels in the tooling and plastics industry due to its ease of machinability, good polishability and dimensional stability. It is particularly suited for large mould cavities, mould bases and tooling components where consistent performance and reduced machining time are essential.

Chargentum supplies premium P20 Tool Steel Round Bars across the UK in a wide range of diameters for plastic mould making, tooling systems and engineering applications, supplied in pre-hardened condition, with full mill certification and traceability to ensure consistent quality and compliance with UK engineering standards.

Diameter (mm)	Weight (kg/m)	Length (mm)	Condition	Grade	Typical Applications
20	2.47	3000-6000	Pre-hardened	P20 (1.2311)	Small mould inserts
25	3.85	3000-6000	Pre-hardened	P20 (1.2311)	Precision tooling
30	5.55	3000-6000	Pre-hardened	P20 (1.2311)	Mould cavities
35	7.55	3000-6000	Pre-hardened	P20 (1.2311)	Tool blocks
40	9.87	3000-6000	Pre-hardened	P20 (1.2311)	Injection mould parts
45	12.49	3000-6000	Pre-hardened	P20 (1.2311)	Mould bases
50	15.42	3000-6000	Pre-hardened	P20 (1.2311)	Plastic mould tooling
55	18.66	3000-6000	Pre-hardened	P20 (1.2311)	Die inserts
60	22.20	3000-6000	Pre-hardened	P20 (1.2311)	Large mould components
65	26.05	3000-6000	Pre-hardened	P20 (1.2311)	Industrial mould tools
70	30.21	3000-6000	Pre-hardened	P20 (1.2311)	Mould frames
75	34.69	3000-6000	Pre-hardened	P20 (1.2311)	Heavy mould tooling
80	39.46	3000-6000	Pre-hardened	P20 (1.2311)	Plastic injection systems
85	44.55	3000-6000	Pre-hardened	P20 (1.2311)	Engineering moulds
90	49.94	3000-6000	Pre-hardened	P20 (1.2311)	Mould tooling blocks
100	61.65	3000-6000	Pre-hardened	P20 (1.2311)	Large mould systems
110	74.59	3000-6000	Pre-hardened	P20 (1.2311)	Industrial mould bases
125	96.33	3000-6000	Pre-hardened	P20 (1.2311)	Heavy mould tooling
140	120.87	3000-6000	Pre-hardened	P20 (1.2311)	Large cavity moulds
150	138.72	3000-6000	Pre-hardened	P20 (1.2311)	Plastic mould systems
160	157.83	3000-6000	Pre-hardened	P20 (1.2311)	Engineering mould blocks
180	199.78	3000-6000	Pre-hardened	P20 (1.2311)	Heavy mould applications
200	246.60	3000-6000	Pre-hardened	P20 (1.2311)	Large industrial moulds
220	298.39	3000-6000	Pre-hardened	P20 (1.2311)	High-volume mould tooling
250	385.31	3000-6000	Pre-hardened	P20 (1.2311)	Heavy-duty mould systems
300	554.85	3000-6000	Pre-hardened	P20 (1.2311)	Large engineering mould blocks

BUY P20 TOOL STEEL ROUND BAR – DIN 1.2311



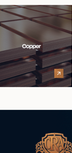
DOWNLOAD FULL TOOL STEEL DATASHEET

Download the complete technical datasheet for Tool steel including:

- Chemical and mechanical properties
- Delivery conditions, tolerances, and finishes
- Full dimension, weight, and grade tables for ground flats and round bars

DOWNLOAD FULL TOOL STEEL DATASHEET

EXPLORE MORE ABOUT CHARGENTUM'S STRUCTURAL STEEL, ENGINEERING STEEL, ALLOY STEEL, PERFORATED SHEETS, SEAMLESS TUBES, TOOL STEEL, STAINLESS STEEL, BRASS, COPPER, ALUMINIUM, GREEN STEEL AND METAL GRADES & SPECIFICATIONS



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