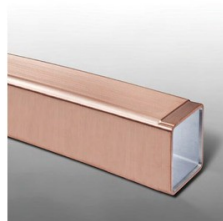


COTI • CANADIAN OVERSEAS TRADE INC.

Spare Parts and Equipment for Rebar Manufacturing

Industrial Maintenance Catalogue

Rebar • Wire rod • Electric steelmaking • Continuous casting



Close-ups: electrodes, billet mould, work rolls and shear blades. [P102](#) [P93](#) [P103](#) [P112](#)

386 item families • 17 sections

COTI coordinates international sourcing of spare parts, consumables and industrial equipment. The range is adapted to each installation's technology, operating conditions and maintenance requirements.

Supplies assessed on request, subject to technical validation, documented origin and availability.

OCTOBER 2026

AMERICA | MIDDLE EAST | ASIA | AFRICA | EUROPE

Canada: 10-7175 Rue Michelet, Montreal, QC H1S 2L8

WhatsApp: +1 438 937 9124 (CA) | +971 54 223 8214 (UAE) — www.coticanada.com

info@coticanada.com

Corporation number: 1070296-0 | Business number (BN): 761282714RC0001 | Québec business number (NEQ): 1173604753

CONNECTING CANADIAN EXCELLENCE WITH GLOBAL OPPORTUNITIES

Scope and supply requirements

This catalogue covers 386 spare-part, heavy-component, consumable and equipment families in 17 sections, from raw-material preparation and optional direct reduction through electric steelmaking, billet casting, rebar/wire rod rolling, utilities, finishing and maintenance. It is an extended enquiry framework, not the certified bill of materials of a particular installation. The final nomenclature is established from drawings, installed references and equipment configuration.

Origin and qualification

Supply selection is restricted to North American or European sources and manufacture; Asian-origin suppliers and manufacture are excluded. Before any order, require the actual manufacturing country, manufacturing-site identity, country-of-origin evidence and traceability. A brand's headquarters, an invoice country or a photograph does not establish where a product was manufactured.

¹ The wording in the origin-certification column is a selection requirement to be verified, not a statement that certification has already been obtained or that a brand has approved COTI. Where no applicable certificate exists, require product specifications, inspection/test records and documented origin. COTI does not attribute an unverified certification to a part.

Reading the technical columns

A standard may govern the assembly, its safety, a material, dimensions, testing or documentation. These scopes are identified in the table; the applicable edition and local regulatory requirements are agreed before ordering. D means: require EN 10204 type 3.1 or 3.2 material documentation for metallic pressure-bearing or load-bearing parts, as an order requirement. This does not impose EN 10204 on every electronic device, refractory mix or lubricant. Q means quality management, not product certification.

[N16](#) · [N17](#) · [N28](#)

Reference materials are selection options, not the composition of a verified supplied model. “n.a.” indicates that a numerical life, grade or exact photograph could not be verified. Replacement criteria listed here are enquiry and monitoring requirements; they are not published universal intervals. Useful life depends on process, loads, temperature, fluids, cooling, maintenance and operating history.

² Actual component photographs and close-ups are embedded directly in the tables and service sections. Each caption identifies the component actually visible, not an exact installed model. A photograph may illustrate several enquiries for the same component family. Factory-wide views, engineering drawings and 3D renders do not substitute for missing component photographs. Items without a suitable photograph remain fully described. P-codes link to source documentation. Images do not prove grade, pressure rating, manufacturing country or stock availability. Official-source photographs require rights-holder permission before public republication.

Production route used to calibrate coverage

The public long-product complex description identifies two 120-ton AC EAFs, two ladle furnaces, two five-strand billet casters, two rebar/bar mills and one wire rod mill. It also identifies two fume-treatment plants, two water-treatment plants and in-line quenching. These are reference configuration facts, not a statement that every component in this catalogue is installed at that complex.

[T01](#)

A 2021 release published nominal annual capacities of 2.5 million tonnes for direct reduction, 2.2 million tonnes for melting and 2 million tonnes for rolling. These are historical published capacities, not verified current annual output.

[T02](#) · [T19](#)

Backup rolls, universal stands, electric/hydraulic oscillators, hot-cutting/flame-cutting equipment, HBI briquetting and boilers are configuration-dependent. Cold strip mills, annealing radiant tubes and strip-coolant systems are not included as compulsory rebar-line equipment. Gas reformers require their own safety specification; EN ISO 13577-2 excludes petrochemical/chemical reformer furnaces.

[T03](#) · [T04](#) · [N05](#)

Catalogue contents

[A Electric arc furnace — melting and charging \(42\)](#)

[B Ladles and secondary metallurgy \(25\)](#)

[C Continuous billet casting — CCM \(35\)](#)

[D Hot rolling mill — bars and wire rod \(41\)](#)

[E Descaling and high-pressure water \(10\)](#)

[F Hydraulics, fluids and lubrication \(28\)](#)

[G Compressed air and pneumatics \(14\)](#)

[H Industrial valves and actuators \(17\)](#)

[I Machine and circuit filtration \(15\)](#)

[J Piping, structures and assemblies \(18\)](#)

[K Electrical, automation and instrumentation \(32\)](#)

[L Dedusting, water and environmental management \(21\)](#)

[M Raw materials and metallurgical consumables \(22\)](#)

[N Integrated direct reduction — additional equipment \(18\)](#)

[O Cooling, energy and distribution utilities \(15\)](#)

[P Finishing, quality control and packaging \(14\)](#)

[Q Mechanical maintenance, lifting and workshop \(19\)](#)

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Standards: correct scope of use

API

API 5L: line pipe; API 6D: pipeline valves within scope; API 609/598: butterfly valves and testing; API 610: petroleum/petrochemical/gas process pumps, not every water pump. API 5CT and 6A are not applied to a rebar line without a casing/tubing or wellhead requirement.

[N13](#) · [N14](#) · [N15](#)

ASME

BPVC VIII: pressure vessels within scope; B31.3: process piping; B16.5/B16.9: flanges/fittings; B16.20/B16.21: gaskets. B18.2.4.1M covers metric style 1 nuts, not stud-bolt material.

[N11](#) · [N12](#) · [N27](#) · [N30](#)

ASTM

Material and testing specifications: A53/A106, A105, A234, A351, A193/A194 and A36 according to product; A615/A706 govern rebar products according to market, not mill spare parts.

[N10](#)

ISO

International standards, not exclusively European or North American. ISO 9001 concerns the quality system. ISO 4413/4414 concern machine circuits; ISO 4414 does not cover the compressor or factory air network. ISO 10241 concerns terminology.

[N06](#) · [N07](#) · [N28](#) · [N34](#)

EN 10204

Metallic-product inspection documents. Request 3.1/3.2 to the purchase specification; verify traceability, tests, responsible representative and batch correspondence. A material certificate does not certify the whole machine.

[N16](#) · [N17](#)

IEC / CEI

International electrical standards; IEC 60519-4 for arc furnace installations, IEC 60239 for electrode dimensions, IEC 60034 for motors, IEC 60076 for transformers according to category, IEC 61800 for drives and IEC 61131 for controllers. IEC 61131-2 alone is not functional-safety certification.

[N01](#) · [N02](#) · [N18](#) · [N19](#) · [N20](#) · [N21](#) · [N29](#)

ATEX / IECEx

ATEX: EU Directive 2014/34/EU for equipment intended for explosive atmospheres. IECEx: international scheme based on IEC standards including IEC 60079. Require documents according to the applicable zone and verify the certificate; IECEx does not automatically replace every national approval.

[N22](#) · [N23](#) · [N35](#)

NACE / AMPP

Merged into AMPP in 2021. NACE MR0175 / ISO 15156 addresses H₂S-exposed materials in oil/gas production and gas treatment; no general sour-service obligation is assigned to an entire steel plant.

[N24](#) · [N33](#)

ANSI

Flange/valve class must be specified to the applicable ASME standard, with material and temperature; “Class 150” does not mean a universal 150 psi or bar pressure rating.

[N11](#)

EN / DIN

EN 15949: long-product mill safety; EN 14753: continuous casting; EN 1092-1: PN flanges; EN 10025-2: non-alloy structural products, excluding hollow sections. EN 13480 has exclusions: do not automatically extend it to every furnace pipe. DIN EN adoptions are not brand certification.

[N03](#) · [N04](#) · [N25](#) · [N26](#) · [N32](#)

A — Electric arc furnace — melting and charging

42 part families. Technical references: [T06](#) · [T05](#) · [T20](#)



[P102](#) Graphite electrodes — protected ends

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A01 Graphite electrodes — diameter, length, UHP/HP/RP grade T06	IEC 60239 (dimensions); IEC 60519-4 (installation) N02 · N01	Graphite; confirm UHP/HP/RP grade to suit furnace power N02	Consumption per tonne/heat; no universal service life	Certified by a recognized brand in North America or Europe	 P102 Graphite electrodes — protected ends
A02 Threaded electrode pins and sockets T06	IEC 60239 (dimensions); IEC 60519-4 (installation) N02 · N01	Graphite; confirm UHP/HP/RP grade to suit furnace power N02	Consumption per tonne/heat; no universal service life	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A03 Furnace transformer and tap changer T06	IEC 60076-1 according to category; specific specification N19	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P02 Electric arc furnace transformer, overall view

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A04 Furnace reactor and network compensation as applicable T06	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A05 Conductive electrode support arms T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A06 Electrode clamps, collars and contacts T06	IEC 60519-4 (assembly); D N01 · N16	Copper; confirm alloy, coating and condition T05	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A07 Electrode lifting columns, masts and guides T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A08 Electrode lifting cylinders and hoses T06	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P57 Hydraulic cylinder — physical cutaway model
A09 Water-cooled power cables and connections T06	IEC 60519-4 (assembly); D N01 · N16	Copper; confirm alloy, coating and condition T05	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A10 Secondary busbars and connections T06	IEC 60519-4 (assembly); D N01 · N16	Copper; confirm alloy, coating and condition T05	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A11 Upper shell and water-cooled panels T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A12 Lower shell and furnace hearth T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A13 Sidewall and slagline bricks T06	Chemical/physical specification to be established; ISO 9001 (Q) N28	MgO-C refractory for sidewall/slagline according to zone T09	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A14 Hearth ramming mix T06	Chemical/physical specification to be established; ISO 9001 (Q) N28	MgO-based dry ramming mix according to bath chemistry T09	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A15 Refractory roof, centre and electrode ports T06	Chemical/physical specification to be established; ISO 9001 (Q) N28	High-alumina refractory / qualify precast composition T09	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A16 Water-cooled roof panels and manifolds T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A17 Roof joints and port seals T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A18 Slag door, frames and mechanism T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A19 Gunning system — lance, hoses and nozzles T06	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A20 Gunning mixes and repair compounds T06	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A21 Oxy-fuel burners and mounting blocks T06	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A22 Oxygen injectors and lances T06	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A23 Carbon injectors and injection pipes T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A24 Gas/oxygen trains, pressure regulation and safety devices T06	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A25 Scrap baskets and bottom doors T06	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A26 Scrap grabs and gripping parts T06	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A27 Lime, carbon and DRI hoppers T06	ASTM A36 or EN 10025-2 according to product; D N10 · N26 · N16	Options: ASTM A36 / S235JR / S355 according to product N10 · N26	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A28 Feeders, screws and raw-material load cells T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P79 Load cell under a tank leg
A29 Continuous charging conveyors and chutes T06	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A30 Tilting — cradles, trunnions and cylinders T06	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P57 Hydraulic cylinder — physical cutaway model

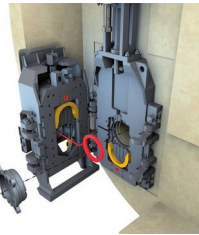
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A31 Roof swing/lift — shafts and bearings T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P33 Bearings in different configurations
A32 Fourth-hole duct and cooled elbows T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A33 Fume sleeves, expansion joints and wear parts T06	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P60 Hinged metal expansion joint
A34 EBT tapping blocks, sleeves and filler if installed T06	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A35 Tap-hole closure mechanism T06	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A36 Cooling-water manifolds and hoses T06	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A37 Water leak, flow and temperature detection T06	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A38 Immersion thermocouples and lance holders T23	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P46 Metallurgical probes and samplers, official-site photograph
A39 Steel samplers and oxygen probes T23	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P46 Metallurgical probes and samplers, official-site photograph
A40 Analysis spectrometer and maintenance parts T22	Establish test specification; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
A41 Off-gas analysers, probes and sample lines T06	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
A42 Position sensors and electrode regulation T06	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P76 Inductive proximity sensor

B — Ladles and secondary metallurgy

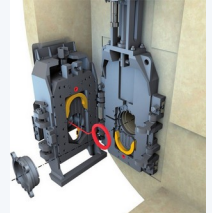
25 part families. Technical references: [T07](#) · [T10](#) · [T11](#)



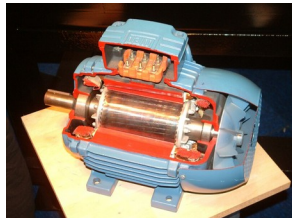
[P98](#) Ladle slide-gate mechanism — actual installed photograph

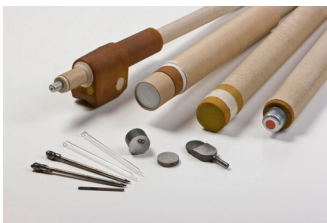
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
B01 Ladle body, shell and stiffeners T07	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
B02 Trunnions, rings, lifting yokes and attachments T07	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B03 Ladle-specific hooks and lifting attachments T07	ASME B30.10 according to hook; D for load-bearing metal N39 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B04 Bottom and wall safety lining T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B05 Bottom and wall working lining T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B06 Slagline bricks and seating blocks T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B07 Repair mixes and jointing compounds T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
B08 Bottom nozzles and collector nozzles T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	 P115 Ladle inner and collector refractory nozzles
B09 Slide-gate refractory plates T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	 P116 Ladle slide-gate refractory plate
B10 Slide-gate frames, springs and mechanism T07	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P98 Ladle slide-gate mechanism — actual installed photograph
B11 Ladle slide-gate cylinder and control T07	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P57 Hydraulic cylinder — physical cutaway model

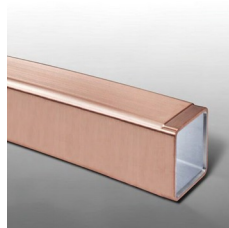
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
B12 Stopper rods — where installed T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	 P134 Helical compression springs
B13 Porous plugs, blocks and argon connections T07	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B14 Argon piping, hoses and regulation T07	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P64 Crimp fittings and hydraulic connector
B15 Slag detector and measuring elements T07	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B16 Ladle tilting or turning mechanism T07	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P57 Hydraulic cylinder — physical cutaway model

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
B17 Ladle cars — wheels, axles and drives T07	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P24 Physical cutaway electric motor
B18 Ladle lid and preheater T07	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B19 Preheater burners, ignition and refractories T07	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B20 Ladle furnace — transformer and reactor T07	IEC 60076-1 according to category; specific specification N19	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P02 Electric arc furnace transformer, overall view

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
B21 Ladle furnace — electrodes and pins T07	IEC 60239 (dimensions); IEC 60519-4 (installation) N02 · N01	Graphite; confirm UHP/HP/RP grade to suit furnace power N02	Consumption per tonne/heat; no universal service life	Certified by a recognized brand in North America or Europe	 P102 Graphite electrodes — protected ends
B22 Ladle furnace — electrode arms, clamps and regulation T07	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B23 Ladle furnace — roof, cooling and fume extraction T07	IEC 60519-4 (assembly); D N01 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B24 Alloy feeders and wire-injection devices T07	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
B25 Ladle weighing, temperature and sampling T07	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P46 Metallurgical probes and samplers, official-site photograph

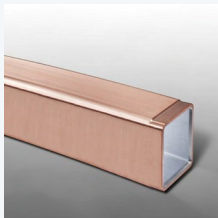
C — Continuous billet casting — CCM

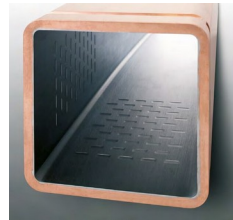
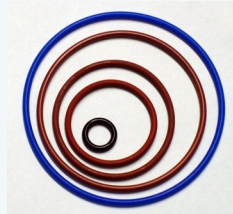
35 part families. Technical references: [T04](#) · [T05](#) · [T10](#) · [T11](#)



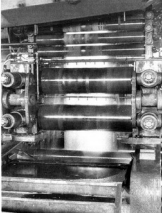
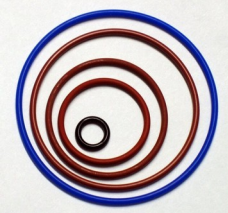
[P93](#) Copper billet mould tube

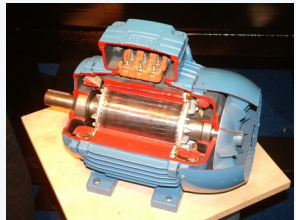
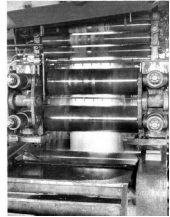
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C01 Tundish — shell, lid and car T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C02 Tundish linings, dams and weirs T04	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C03 Submerged or open nozzles according to process T04	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C04 Tundish stopper rods and slide gates according to design T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P113 Tundish slide-gate plates — photographed batch
C05 Tundish preheating — burners and accessories T04	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C06 Copper mould tubes — billet section T04	EN 14753 (assembly); D N03 · N16	Copper; confirm alloy, coating and condition T05	Published design example: up to 60,000 t; not transferable to other moulds. Confirm campaign life. T21	Certified by a recognized brand in North America or Europe	 P93 Copper billet mould tube
C07 Copper plates — only for a plate-mould design T04	EN 14753 (assembly); D N03 · N16	Copper; confirm alloy, coating and condition T05	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	 P95 Machined copper mould plate

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C08 Sleeves, water jackets and mould housings T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C09 Mould coatings and treatments T04	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P94 Copper mould — close-up of the inner surface
C10 Mould O-rings and seals T04	EN 14753 (assembly); D N03 · N16	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings
C11 Mould oscillator — frame, shafts and guides T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C12 Oscillation cylinders, servo valves and accumulators T04	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P44 Electrohydraulic servo valve, product photograph

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C13 Oscillator position sensors T04	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P76 Inductive proximity sensor
C14 Mould level detection and control T04	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C15 Primary cooling — manifolds and fittings T04	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C16 Primary cooling — flowmeters and sensors T04	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C17 Secondary cooling — nozzles and nozzle holders T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C18 Spray headers, pipes and water filters T04	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C19 Guide rolls and support segments T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P110 Continuous-casting guide and extraction rolls
C20 Roll shafts, bearings and bearing housings T04	ISO 281 (calculation); D for load-bearing material N09 · N16	Bearing steel; cage and treatments to suit load T15	n.a.: ISO 281 calculation from load/speed and condition	Certified by a recognized brand in North America or Europe	 P33 Bearings in different configurations
C21 Bearing seals and scale guards T04	EN 14753 (assembly); D N03 · N16	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C22 Extraction — pinch rolls and drives T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P24 Physical cutaway electric motor
C23 Straightener — rolls, cylinders and guides T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P110 Continuous-casting guide and extraction rolls
C24 Dummy bar — head, links and flexible sections T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C25 Dummy-bar storage and return system T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C26 Hot-cutting shear — where fitted T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P112 Dividing shear blades — machined components
C27 Flame-cutting machine — where fitted T04	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C28 Shear blades, cutting heads and cutting consumables T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C29 Billet roller tables, stops and transfer equipment T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C30 Billet marking and identification T04	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C31 Electromagnetic stirrers — if installed T04	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
C32 Mould lubrication/powder according to practice T04	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C33 Breakout detection and pyrometry T04	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
C34 CCM hoses, quick couplings and hydraulic kits T04	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P64 Crimp fittings and hydraulic connector
C35 Guards, heat shields and maintenance access T04	EN 14753 (assembly); D N03 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

D — Hot rolling mill — bars and wire rod

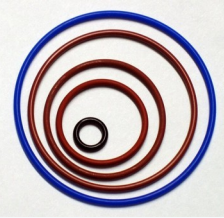
41 part families. Technical references: [T03](#) · [T05](#) · [T14](#)



[P103](#) Work rolls — bodies and journals

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D01 Reheating furnace — walking beam or pusher T03	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D02 Burners, igniters and flame detectors T03	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D03 Reheating roof, wall and hearth refractories T03	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D04 Furnace skids, supports and insulation T03	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D05 Furnace doors, pushers and discharge equipment T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D06 Combustion recuperators, ducts and expansion joints T03	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	 P60 Hinged metal expansion joint
D07 Horizontal and vertical stands — to suit architecture T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D08 Universal stands — only if installed T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D09 Work rolls — body, diameter and profile T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P103 Work rolls — bodies and journals
D10 Backup rolls — not universal in bar mills T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P104 Backup roll — body and journals

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D11 Rolling rings — qualify material T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D12 Roll bearing housings and chocks T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D13 Radial and thrust roll bearings T03	ISO 281 (calculation); D for load-bearing material N09 · N16	Bearing steel; cage and treatments to suit load T15	n.a.: ISO 281 calculation from load/speed and condition	Certified by a recognized brand in North America or Europe	 P33 Bearings in different configurations
D14 Bearing seals and sealing rings T03	EN 15949 (assembly); D N04 · N16	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings
D15 Screwdown screws, nuts and roll-gap mechanisms T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D16 Clamping cylinders and stand-change devices T03	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P57 Hydraulic cylinder — physical cutaway model
D17 Cardan shafts, spindles and drive couplings T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P55 Flanged shaft coupling
D18 Gearboxes, pinion stands and internal parts T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P78 Externally toothed shaft
D19 Multi-stand wire rod finishing blocks T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D20 Entry and exit guides — static and roller types T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P96 Roller guide — entry rollers
D21 Guide rollers, shafts and bushes T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P97 Machined guide roller
D22 Guide boxes and adjustment devices T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P96 Roller guide — entry rollers
D23 Roll passes, grooves and roll-machining tooling T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D24 Slitting guides — for slit rolling T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D25 Pinch rolls and traction devices T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D26 Crop and cobble shears T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D27 Flying and rotary shears T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 <p>P112 Dividing shear blades — machined components</p>
D28 Blades, blade holders and cutting mechanisms T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 <p>P112 Dividing shear blades — machined components</p>
D29 Runout roller tables and transfer guides T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D30 Bar cooling bed — rakes, grids and mechanisms T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D31 Bar straightener — if fitted T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D32 Bar quenching/self-tempering system — boxes and tubes T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D33 Nozzles, inserts and roll cooling T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D34 Quench-water headers and control T03	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D35 Laying head — wire rod only T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D36 Laying-head pipes and guide parts T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

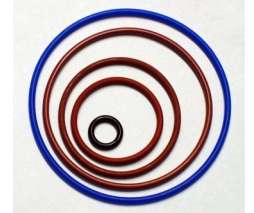
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
D37 Ring-cooling conveyor and fans T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P107 Centrifugal fan — housing and inlet
D38 Coil reforming and coil handling T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D39 Coiler — only where the line design includes one T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D40 Strapping machine, coil compactor and accessories T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
D41 Speed, loop, dimension and temperature sensors T03	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P38 Type K thermocouple probe

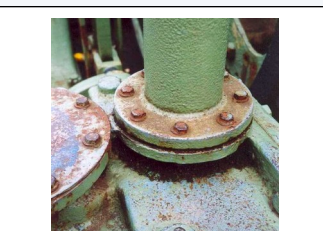
E — Descaling and high-pressure water

10 part families. Technical references: [T03](#) · [T05](#)



[P101](#) High-pressure descaling nozzles

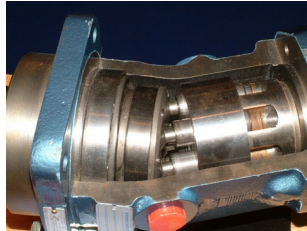
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
E01 Descaling pumps — validate the 100–200 bar range T03	Hydraulic specification; API 610 for eligible service; D N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P126 High-pressure water plunger pump
E02 Pump impellers, shafts and internal parts T03	Hydraulic specification; API 610 for eligible service; D N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
E03 Mechanical seals and seal kits T03	Hydraulic specification; API 610 for eligible service; D N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
E04 Descaling nozzles and inserts T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P101 High-pressure descaling nozzles
E05 Nozzle holders and spray headers T03	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
E06 High-pressure isolation and control valves T03	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P127 Water pressure-regulating valves
E07 High-pressure piping, flanges and fittings T03	ASTM A53/A106 according to pipe; ASME B31.3; D N10 · N12 · N16	Carbon steel; A53/A106 grade according to service N10	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P86 Bolted flanged joint

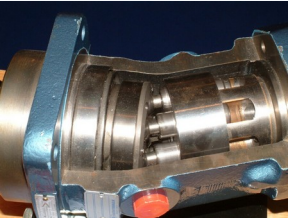
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
E08 High-pressure water filters and elements T03	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
E09 Pulsation dampeners and accumulators if installed T03	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P68 Piston hydraulic accumulators
E10 Pressure, flow and temperature instrumentation T03	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P106 Pressure gauge — dial and connection

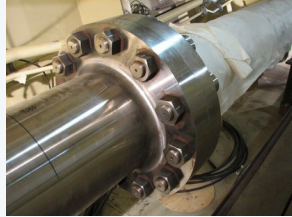
F — Hydraulics, fluids and lubrication

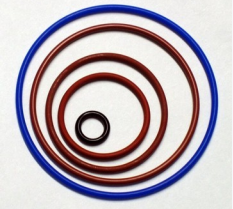
28 part families. Technical references: [T11](#) · [T12](#) · [T13](#) · [T14](#)



[P56](#) Physical cutaway multi-piston pump

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
F01 Hydraulic power units — reservoirs and frames T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P137 Hydraulic power unit — installed-unit detail
F02 Axial or radial piston pumps T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P56 Physical cutaway multi-piston pump

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
F03 Gear and standby pumps T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P118 Gear-pump rotors — mechanical components
F04 Pump couplings and bell housings T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P55 Flanged shaft coupling
F05 Electrohydraulic servo valves T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P44 Electrohydraulic servo valve, product photograph
F06 Directional and proportional valves T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F07 Pressure relief and flow control valves T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
F08 Drilled blocks, manifolds and cartridges T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F09 Cylinders — barrels, rods, pistons and guides T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P57 Hydraulic cylinder — physical cutaway model
F10 Cylinder seal and wiper kits T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings
F11 Accumulators — bladders, diaphragms and valves T11	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F12 Hydraulic hoses, tubes and fittings T11	ISO 4413 (system); D for pressure-bearing metal N06 · N16	n.a.: confirm grade and construction from drawing	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P64 Crimp fittings and hydraulic connector

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
F13 Suction filters and strainers T11	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P50 Hydraulic filter element product photograph
F14 Pressure filters and replacement elements T11	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P50 Hydraulic filter element product photograph
F15 Return filters and replacement elements T11	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P50 Hydraulic filter element product photograph
F16 Reservoir breathers and desiccants T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
F17 Clogging indicators and ΔP sensors T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F18 Offline filtration units T11	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F19 Oil coolers and heat exchangers T11	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P71 Dismantled plate heat exchanger
F20 Oil heaters, sensors and level controls T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F21 Hydraulic oils — specify viscosity and additives T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: specify base fluid, viscosity and compatibility	n.a.: fluid analysis and contamination	Certified by a recognized brand in North America or Europe	 P42 Lubricating-oil samples

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
F22 Fire-resistant fluids — qualify compatibility T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: specify base fluid, viscosity and compatibility	n.a.: fluid analysis and contamination	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F23 Centralized lubrication pumps T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F24 Grease distributors, metering units and injectors T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F25 Automatic lubricators and cartridges T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
F26 Lubrication pipes, fittings and hoses T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P64 Crimp fittings and hydraulic connector

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
F27 Bearing greases and gearbox lubricants T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: specify base fluid, viscosity and compatibility	n.a.: fluid analysis and contamination	Certified by a recognized brand in North America or Europe	 P42 Lubricating-oil samples
F28 Rolling oils/emulsions — only where required by process T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: specify base fluid, viscosity and compatibility	n.a.: fluid analysis and contamination	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

G — Compressed air and pneumatics

14 part families. Technical references: [T13](#)



[P81](#) Compressed-air coalescing filters

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
G01 Air compressors — screw or specified technology T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
G02 Compressor elements, belts and couplings T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
G03 Refrigerated or adsorption dryers T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
G04 Desiccants and dryer kits T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
G05 Air receivers and safety accessories T13	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
G06 Coalescing filters and condensate separators T13	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: ΔP , contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P122 Compressed-air coalescing filter
G07 Pressure regulators T13	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
G08 Lubricators and FRL assemblies T13	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
G09 Pneumatic directional and solenoid valves T13	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P111 Pneumatic directional-valve manifold
G10 Pneumatic cylinders and seal kits T13	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P119 Pneumatic cylinder
G11 Hoses, tubing and quick couplings T13	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: confirm grade and construction from drawing	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P123 Pneumatic quick coupling
G12 Automatic condensate drains T13	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
G13 Silencers and exhaust elements T13	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: confirm grade and construction from drawing	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
G14 Air-pressure gauges and sensors T13	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P106 Pressure gauge — dial and connection

H — Industrial valves and actuators

17 part families. Technical references: [T05](#)



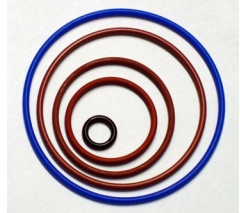
[P70](#) Control valve with positioner

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
H01 Butterfly valves — wafer, lug or flanged to suit network T05	API 609; API 598 by contract; D N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P17 Butterfly valve
H02 Ball valves — full/reduced bore T05	ASME B16.34; API 6D for pipeline service; D N11 · N14 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P16 Ball valve

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
H03 Check valves — dual-plate, piston or swing T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P18 Wafer check valve, internal view
H04 Gate valves — wedge type T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P59 Gate valve
H05 Knife-gate valves — distinct from wedge gate valves T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
H06 Globe valves and throttling devices T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P69 Globe valve — body and handwheel

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
H07 Control valves — bodies, trims and seats T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P70 Control valve with positioner
H08 Safety and pressure-relief valves T05	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P65 Pressure relief valve — cooling circuit
H09 Gas valves and safety shut-off devices T05	EN ISO 13577-2 (assembly); D for load-bearing metal N05 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
H10 Oxygen-service valves — qualify cleanliness T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
H11 Stainless-steel valve bodies — CF8M where specified T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	ASTM A351 CF8M stainless casting option; qualify other grades N10	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
H12 Seats, discs, balls and closure elements T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
H13 Stems, packing and stuffing boxes T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
H14 Pneumatic actuators and return springs T05	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
H15 Electric actuators and gearboxes T05	IEC 60034-1; Ex for classified zone N18 · N22 · N23	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P66 Electric valve actuator
H16 Positioners, limit switches and transmitters T05	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P70 Control valve with positioner

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
H17 Seal, gasket and mounting kits T05	ASME B16.34 according to type; API 598 by contract; D N11 · N13 · N16	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings

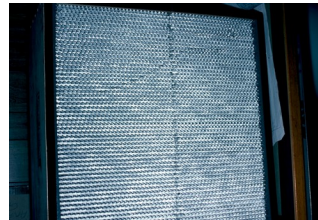
I — Machine and circuit filtration

15 part families. Technical references: [T13](#)

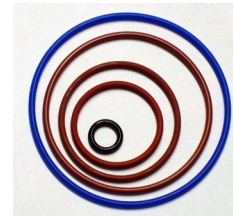


[P50](#) Hydraulic filter element product photograph

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
I01 Compressor intake air filters T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP , contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
I02 Engine and auxiliary-generator air filters T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP , contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
I03 Cabin and ventilation air filters T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P125 HEPA filter media close-up
I04 Engine oil filters T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P43 Engine oil filter
I05 Gearbox and circulating-oil filters T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
I06 Fuel filters and water/fuel separators T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	Published example: 500 h or annually, with other earlier triggers; only for the documented filter reference, not a universal interval. T24	Certified by a recognized brand in North America or Europe	 P47 Fuel/water separator product photograph

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
I07 Hydraulic suction elements T13	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP , contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P50 Hydraulic filter element product photograph
I08 Hydraulic return elements T13	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP , contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P50 Hydraulic filter element product photograph
I09 Hydraulic pressure elements T13	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP , contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P50 Hydraulic filter element product photograph
I10 Compressor air/oil separators T13	Product specification to be established; ISO 9001 (Q) N28	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP , contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
I11 Condensate water/oil separators T13	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
I12 Process-water filters — basket/cartridge to suit circuit T13	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: media, support and seals to suit fluid and reference T13	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
I13 Duplex filters and changeover devices T13	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
I14 Filter housings, covers and bolting T13	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
I15 Filter seals, bypass kits and indicators T13	ISO 16889 (element); ISO 4413 (circuit) N08 · N06	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings

J — Piping, structures and assemblies

18 part families. Technical references: [T05](#)

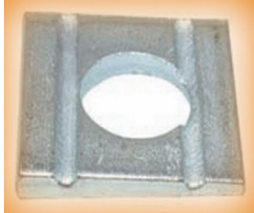


[P85](#) Tee fittings — different materials

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
J01 ERW steel pipes — diameter, wall thickness and grade T05	ASTM A53/A106 according to pipe; ASME B31.3; D N10 · N12 · N16	Carbon steel; A53/A106 grade according to service N10	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P45 Steel tubes in Canada
J02 Seamless steel pipes — service and temperature T05	ASTM A53/A106 according to pipe; ASME B31.3; D N10 · N12 · N16	Carbon steel; A53/A106 grade according to service N10	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P45 Steel tubes in Canada

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
J03 Line pipe — API 5L only where specified T05	API 5L for line pipe; ASME B31.3; D N15 · N12 · N16	Carbon steel; A53/A106 grade according to service N10	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P45 Steel tubes in Canada
J04 Stainless-steel piping — establish grade/standard T05	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
J05 Forged ASME flanges and European PN flanges T05	ASTM A105; ASME B16.5 or EN 1092-1; D N10 · N11 · N25 · N16	ASTM A105 forged carbon steel where applicable N10	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P86 Bolted flanged joint
J06 Buttwelding elbows, tees and reducers T05	ASTM A234; ASME B16.9; D N10 · N11 · N16	ASTM A234 carbon/alloy steel; specify grade N10	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P85 Tee fittings — different materials

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
J07 Caps, end closures and branches to suit construction T05	ASTM A234; ASME B16.9; D N10 · N11 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
J08 Expansion joints, metal hoses and supports T05	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P60 Hinged metal expansion joint
J09 Flat flange gaskets T05	ASME B16.20 (metallic) or B16.21 (non-metallic flat) N11	Options: fibres/PTFE/graphite; metal to suit gasket N11 · P11	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P11 Flat fibre, PTFE and graphite gaskets
J10 Spiral-wound gaskets and rings — to suit facing T05	ASME B16.20 (metallic) or B16.21 (non-metallic flat) N11	Options: fibres/PTFE/graphite; metal to suit gasket N11 · P11	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
J11 High-pressure/temperature studs and bolts T05	ASTM A193/A194; D; dimensions to suit assembly N10 · N16	Option: ASTM A193 B7 alloy steel; matching A194 nut N10	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P19 Studs and nuts

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
J12 Metric style 1 nuts — specify dimensions and class T05	ASME B18.2.4.1M (style 1 nut); specify material; D N27 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P19 Studs and nuts
J13 Washers, locking washers and fasteners T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P133 Square steel washer
J14 Structural I/H sections and angles T05	ASTM A36 or EN 10025-2 according to product; D N10 · N26 · N16	Options: ASTM A36 / S235JR / S355 according to product N10 · N26	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P20 Steel I-section
J15 Structural sheets and plates T05	ASTM A36 or EN 10025-2 according to product; D N10 · N26 · N16	Options: ASTM A36 / S235JR / S355 according to product N10 · N26	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
J16 Structural hollow sections — confirm specific standard T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
J17 Grating, stairways and guardrails T05	ASTM A36 or EN 10025-2 according to product; D N10 · N26 · N16	Options: ASTM A36 / S235JR / S355 according to product N10 · N26	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
J18 Wear plates and liners — grade to drawing T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

K — Electrical, automation and instrumentation

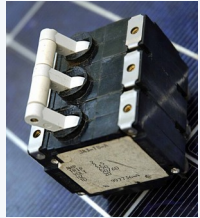
32 part families. Technical references: [T11](#) · [T20](#)



[P62](#) Modular PLC — CPU and modules

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K01 AC motors — power, cooling and duty T11	IEC 60034-1; Ex for classified zone N18 · N22 · N23	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P24 Physical cutaway electric motor

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K02 DC motors — brushes, commutators and ventilation T11	IEC 60034-1; Ex for classified zone N18 · N22 · N23	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K03 Motor bearings, seals and fans T11	ISO 281 (calculation); D for load-bearing material N09 · N16	Bearing steel; cage and treatments to suit load T15	n.a.: ISO 281 calculation from load/speed and condition	Certified by a recognized brand in North America or Europe	 P33 Bearings in different configurations
K04 Variable frequency drives and power modules T11	IEC 61800-5-1; Ex where relevant N20 · N22 · N23	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P67 Variable-frequency drive — control face
K05 Rectifiers and DC drives T11	IEC 61800-5-1; Ex where relevant N20 · N22 · N23	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

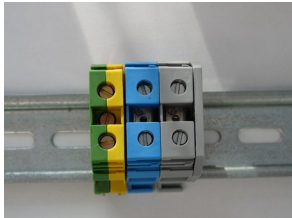
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K06 Control boards and communication modules T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P62 Modular PLC — CPU and modules
K07 Auxiliary transformers T11	IEC 60076-1 according to category; specific specification N19	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K08 Circuit breakers, contactors and isolators T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P73 Three-pole circuit breaker
K09 Fuses, relays and electrical protection T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P135 Industrial cartridge fuse

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K10 Power cables — copper/aluminium according to study T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K11 Control, network and fibre-optic cables T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K12 Connectors, terminals, cable glands and cable trays T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P82 Power terminal blocks on a DIN rail
K13 Position/speed encoders and resolvers T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P61 Absolute encoder — dismantled disk and sensor

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K14 Inductive/optical sensors and presence barriers T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P76 Inductive proximity sensor
K15 Pressure transmitters and gauges T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P106 Pressure gauge — dial and connection
K16 Thermocouples, resistance sensors and pyrometers T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P38 Type K thermocouple probe

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K17 Level measurement — reservoir, tundish, mould T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P92 Differential-pressure level transmitter
K18 Flowmeters and flow switches T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K19 Load cells and load instrumentation T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P79 Load cell under a tank leg
K20 PLC/PAC systems — CPU and I/O modules T11	IEC 61131-2 (function/EMC); qualify safety requirements N21	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P62 Modular PLC — CPU and modules

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K21 Racks, power supplies and backup batteries T11	IEC 61131-2 (function/EMC); qualify safety requirements N21	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P63 Industrial 24 V power supply
K22 HMIs, industrial displays and operator stations T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K23 Control cabinets and panels T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K24 Cabinet ventilation and air conditioning T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K25 Industrial networks, switches and gateways T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P83 Industrial Ethernet switch
K26 Uninterruptible supplies and UPS systems T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K27 Emergency-stop chains and interlocks T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P72 Dismantled emergency-stop button
K28 Safety modules — determine required safety level T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K29 Bearing vibration, speed and temperature sensors T11	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K30 Ex equipment — only for classified zones T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
K31 Earthing, equipotential bonding and connections T11	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P82 Power terminal blocks on a DIN rail

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
K32 Power-drive cooling components T11	IEC 61800-5-1; Ex where relevant N20 · N22 · N23	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

L — Dedusting, water and environmental management

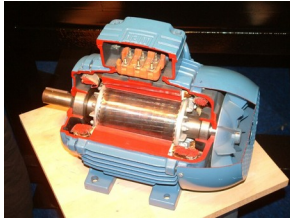
21 part families. Technical references: [T01](#) · [T17](#)



[P108](#) Filter bags — detail of the elements

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
L01 Primary furnace fume extraction T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L02 Secondary hoods and extraction ducts T01	ASTM A36 or EN 10025-2 according to product; D N10 · N26 · N16	Options: ASTM A36 / S235JR / S355 according to product N10 · N26	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
L03 Ducts, elbows, expansion joints and liners T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P60 Hinged metal expansion joint
L04 Bag filters — housings and chambers T01	ASTM A36 or EN 10025-2 according to product; D N10 · N26 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L05 Filter bags and media to suit temperature T01	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	 P108 Filter bags — detail of the elements
L06 Bag cages/supports and mounting T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L07 Pulse-cleaning valves, diaphragms and solenoids T01	ISO 4414 (machine); D for pressure-bearing metal N07 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
L08 Pulse-air receivers and fittings T01	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L09 Electrostatic precipitators — only if installed T01	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L10 Centrifugal fans — impellers, shafts and casings T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P107 Centrifugal fan — housing and inlet
L11 Fan bearings, couplings and motors T01	ISO 281 (calculation); D for load-bearing material N09 · N16	Bearing steel; cage and treatments to suit load T15	n.a.: ISO 281 calculation from load/speed and condition	Certified by a recognized brand in North America or Europe	 P24 Physical cutaway electric motor

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
L12 Fume dampers, flaps and actuators T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P66 Electric valve actuator
L13 Fire dampers — confirm classification T01	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L14 Dust hoppers, screws and rotary airlocks T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P87 Screw conveyor — equipment during manufacture
L15 Pneumatic dust conveying and loading T01	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L16 Lime injection — only if required by treatment process T01	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
L17 ΔP, temperature and emission sensors T01	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L18 Scale pits, pumps and scrapers T01	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L19 Settling, filtration and water recycling T01	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L20 Slag pots, containers and handling accessories T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
L21 Slag crushing, screening and metal recovery T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

M — Raw materials and metallurgical consumables

22 part families. Technical references: [T06](#) · [T18](#) · [T19](#)



[P117](#) Iron-ore pellets — close-up of samples

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
M01 Steel scrap — classes, cleanliness and dimensions T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P26 Steel scrap bales at a recycling facility
M02 DRI — composition, metallization and fines T06	Product specification to be established; ISO 9001 (Q) N28	Iron-bearing material; chemical analysis and sizing required T02	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M03 HBI — only where used as feedstock T06	Product specification to be established; ISO 9001 (Q) N28	Iron-bearing material; chemical analysis and sizing required T02	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P40 Hot-briquetted direct reduced iron

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
M04 Iron ore/pellets — for an integrated DRI route T06	Product specification to be established; ISO 9001 (Q) N28	Iron-bearing material; chemical analysis and sizing required T02	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P117 Iron-ore pellets — close-up of samples
M05 Quicklime — CaO content and reactivity T06	Product specification to be established; ISO 9001 (Q) N28	Lime / CaO base; specify purity and reactivity T18	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P37 Calcium oxide powder
M06 Dolomite/calcined dolomite — analysis and moisture T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P48 Dolomite specimen

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
M07 Carburizing carbon and injection carbon T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P52 Anthracite and coke
M08 Ferrosilicon — FeSi to suit melt recipe T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P34 Ferrosilicon samples
M09 Ferromanganese — FeMn to suit melt recipe T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P36 Ferromanganese samples
M10 Ferrovanadium — FeV for the steel grade produced T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P121 Ferrovanadium sample

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
M11 Ferroniobium — FeNb for the steel grade produced T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M12 Other ferroalloys — only to a qualified melt recipe T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M13 Deoxidizers and slag conditioners T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P34 Ferrosilicon samples
M14 Lime-based ladle desulfurizers T06	Product specification to be established; ISO 9001 (Q) N28	Lime / CaO base; specify purity and reactivity T18	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P37 Calcium oxide powder
M15 Calcium aluminates and specified fluxes T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M16 Process oxygen — purity and pressure T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: process gas and purity to suit installation	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
M17 Stirring argon — purity and distribution T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: process gas and purity to suit installation	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M18 Process nitrogen — confirm use T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: process gas and purity to suit installation	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P28 Nitrogen cylinder and regulator
M19 Acetylene/cutting gas — to suit maintenance station T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: process gas and purity to suit installation	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M20 Refractory consumables — mixes, coatings and jointing T06	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M21 Casting powders, oils and agents — qualify practice T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
M22 Cored wires and treatment alloys — where practice requires T06	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

N — Integrated direct reduction — additional equipment

18 part families. Technical references: [T19](#) · [T02](#)



[P71](#) Dismantled plate heat exchanger

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
N01 Ore/pellet handling — conveyors and chutes T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N02 Screens, sieves and fines-separation parts T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N03 Hoppers, feeders and charging valves T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N04 Shaft furnace — shell and drawing-specific elements T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N05 Shaft furnace refractories and anchors T19	Chemical/physical specification to be established; ISO 9001 (Q) N28	n.a.: confirm refractory composition by analysis T10	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

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Canada: 10-7175 Rue Michelet, Montreal, QC H1S 2L8

WhatsApp: +1 438 937 9124 (CA) | +971 54 223 8214 (UAE) — www.coticanada.com

info@coticanada.com

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CONNECTING CANADIAN EXCELLENCE WITH GLOBAL OPPORTUNITIES

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
N06 Gas reforming — tubes and elements where technology includes it T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N07 Catalyst — only if a reformer is installed T19	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N08 Process-gas compressors/blowers T19	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N09 Gas coolers, heat exchangers and separators T19	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P71 Dismantled plate heat exchanger
N10 Gas scrubbing/filtration — equipment and media T19	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
N11 Reducing-gas pipes and valves T19	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P16 Ball valve
N12 DRI discharge — valves, wheels and mechanisms T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N13 Hot DRI transport — only if installed T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: monitor heats/campaign and remaining condition	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N14 DRI cooling and storage T19	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N15 HBI briquetting — only for an equipped installation T19	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
N16 Gas analysis and leak detection T19	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
N17 Pressure, temperature and composition instrumentation T19	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P106 Pressure gauge — dial and connection
N18 Gas safety, purging and inerting T19	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

O — Cooling, energy and distribution utilities

15 part families. Technical references: [T01](#) · [T12](#)



[P71](#) Dismantled plate heat exchanger

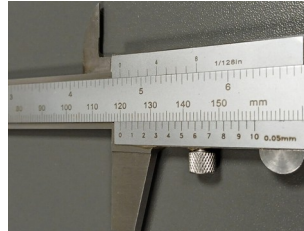
Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
O01 Cooling-water and standby pumps T01	Hydraulic specification; API 610 for eligible service; D N13 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P08 Centrifugal pumps
O02 Water/water and water/oil heat exchangers T01	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P71 Dismantled plate heat exchanger
O03 Cooling towers — fill and drift eliminators T01	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
O04 Tower fans, gearboxes and drives T01	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O05 Cooling tanks, headers and valves T01	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O06 Water treatment — filters, media and dosing T01	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: ΔP, contamination and manufacturer limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O07 Chemical dosing pumps and accessories T01	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O08 Heat-exchanger gaskets, tubes and plates T01	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P71 Dismantled plate heat exchanger
O09 Tanks and pressure vessels T01	ASME BPVC VIII or EN 13445 according to parent vessel; D N30 · N31 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
O10 Industrial water, air and gas networks T01	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O11 Boiler — only if steam is installed T01	ASME BPVC I or IV according to boiler; D N36 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O12 Generator sets and engine maintenance T01	IEC 60034-1; Ex for classified zone N18 · N22 · N23	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O13 Firewater pumps, valves and accessories T01	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O14 Electrical distribution and substation cooling T01	IEC 61000 (EMC, applicable part); electrical specification N29	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
O15 Drainage networks and lift pumps T01	ASME B31.3 for piping; specify vessel code; D N12 · N16	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P08 Centrifugal pumps

P — Finishing, quality control and packaging

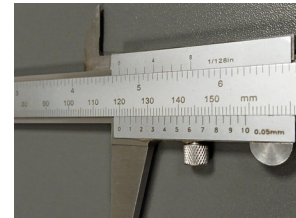
14 part families. Technical references: [T03](#) · [T05](#)



[P90](#) Vernier caliper — close-up of the scale

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
P01 Cut-to-length shearing and measuring stops T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P02 Bar collecting, counting and alignment T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P03 Bundling, strapping and bundle tying T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P04 Tying wire, strapping and ties T03	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
P05 Bundle and coil weighing T03	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P79 Load cell under a tank leg
P06 Marking, labelling and batch traceability T03	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P07 Coil compacting and guide parts T03	EN 15949 (assembly); D N04 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P08 Finished-product hooks, pallets and transport T03	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P09 Tensile tests — grips, extensometers and accessories T03	ISO 15630-1 (mechanical tests); product to contract N37	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P109 Tensile-test machine — gripping area

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
P10 Bend/rebend tests — mandrels and tooling T03	ISO 15630-1 (mechanical tests); product to contract N37	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P11 Diameter, linear mass and rib geometry measurement T03	ASTM A615/A706 according to product and contract N10	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	 P90 Vernier caliper — close-up of the scale
P12 Sample preparation and laboratory consumables T03	Establish test specification; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P136 Metallographic preparation disc
P13 Standards, check samples and spectrometer consumables T03	Establish test specification; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
P14 Non-destructive testing — where required by product/contract T03	ASME BPVC V for relevant construction; specify tests N36	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

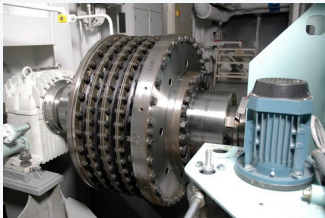
Q — Mechanical maintenance, lifting and workshop

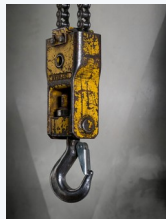
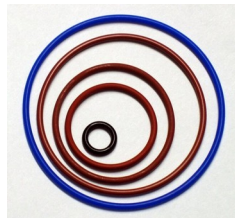
19 part families. Technical references: [T05](#) · [T14](#) · [T16](#) · [T17](#)



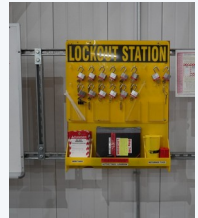
[P91](#) Mechanical claw puller

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
Q01 Bearings — radial, thrust and heavy-duty T05	ISO 281 (calculation); D for load-bearing material N09 · N16	Bearing steel; cage and treatments to suit load T15	n.a.: ISO 281 calculation from load/speed and condition	Certified by a recognized brand in North America or Europe	 P33 Bearings in different configurations
Q02 Bearing housings, rings, bushes and plain bearings T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
Q03 Gears, shafts and gearbox parts T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P78 Externally toothed shaft

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
Q04 Couplings, cardan shafts and flexible elements T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P131 Industrial flexible coupling
Q05 Belts, chains, pulleys and sprockets T05	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P132 Industrial roller chain detail
Q06 Brakes, linings and braking actuators T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
Q07 Overhead cranes — wheels, axles and mechanisms to drawing T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
Q08 Winches, hoists and lifting gearboxes T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
Q09 Steel ropes, sheaves and lifting drums T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P74 Steel wire rope — thimble, eye and termination
Q10 Hooks, slings and certifiable lifting accessories T05	ASME B30.9/B30.10 according to accessory; D if metallic N38 · N39 · N16	n.a.: confirm grade and construction from drawing	n.a.: cycles, fatigue and clearance checks	Certified by a recognized brand in North America or Europe	 P120 Lifting hook with safety latch
Q11 Seals, wipers and mechanical sealing kits T05	Product specification to be established; ISO 9001 (Q) N28	n.a.: qualify elastomer/PTFE for fluid and temperature	n.a.: leakage, compression, temperature and ageing	Certified by a recognized brand in North America or Europe	 P21 Assorted O-rings
Q12 Wear-resistant plates and repair elements T05	Drawing and specification to be established; D N16	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
Q13 Welding/hardfacing electrodes and wires T05	ASME BPVC IX for relevant construction; ISO 9001 (Q) N36 · N28	Hardfacing options: iron, nickel or cobalt base T16	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	 P88 Welding electrodes and electrode holder
Q14 Welding torches, nozzles and machine parts T05	ASME BPVC IX for relevant construction; ISO 9001 (Q) N36 · N28	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	 P89 Oxy-fuel welding torch
Q15 Machining, grinding and drilling tooling T05	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: wear monitoring and dimensional limit	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.
Q16 Alignment and vibration-checking equipment T05	Establish test specification; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition, drift and specified calibration interval	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Part / specification	Applicable standard(s)	Reference material	Indicative service life	Origin certification ¹ (requirement to verify)	Embedded real photograph ²
Q17 Bearing removal, installation and heating equipment T05	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P91 Mechanical claw puller
Q18 Maintenance guard and lockout components T05	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	n.a.: condition monitoring and maintenance specification	Certified by a recognized brand in North America or Europe	 P124 Lockout station and padlocks
Q19 Cleaning, preservation and corrosion-protection products T05	Product specification to be established; ISO 9001 (Q) N28	n.a.: confirm grade and construction from drawing	Consumed per batch/heat; no service life in years	Certified by a recognized brand in North America or Europe	Detail photograph not available in this edition.

Preparing an accurate enquiry

Provide the production route, equipment designation, serial number and installed reference; drawings, interface dimensions and tolerances; operating loads, speed, temperature, pressure and fluids; quantities, interchangeability requirements and delivery constraints. Supply clear photographs of the installed part where available.

Define criticality, the shutdown window and minimum spares stock from site history. Refractory life should be tracked by heats/tonnes and residual thickness; wear parts by profile and dimensions; filters by pressure drop and contamination; hydraulic components by leakage and response; bearings by calculated life and condition. Numerical intervals require the operating data and a validated maintenance prescription.

[N08](#) · [N09](#) · [N06](#)

In the quotation, confirm manufacturing origin, material grade, dimensional compliance, test scope, documents, availability, lead time and logistics. Any substitution or equivalent must be approved against the installed configuration. Visits and technical meetings may be coordinated by appointment and with the site's agreement.

info@coticanada.com • www.coticanada.com • +1 438 937 9124

Original photographic references

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P02 Electric arc furnace transformer, overall view

https://commons.wikimedia.org/wiki/File:Electrical_Arc_Furnace_Transformer.jpg

Photo credit: Dermartinrockt

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P08 Centrifugal pumps: family, no 100–200 bar rating established

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P11 Flat fibre, PTFE and graphite gaskets

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P16 Ball valve

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P17 Butterfly valve

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P18 Wafer check valve, internal view

<https://commons.wikimedia.org/wiki/File:Inside-wafer-check-valve-The-Alloy-Valve-Stockist.JPG>

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P19 Studs and nuts

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P20 Steel I-section

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P21 Assorted O-rings

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P24 Physical cutaway electric motor: family illustration

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P26 Steel scrap bales at a recycling facility

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P28 Nitrogen cylinder and regulator: not a universal illustration for all gases

https://commons.wikimedia.org/wiki/File:A_nitrogen_gas_cylinder_with_pressure-relief_devices.jpg

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P33 Bearings in different configurations

https://commons.wikimedia.org/wiki/File:Bearing_01.JPG

Photo credit: Redline

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P34 Ferrosilicon samples

https://commons.wikimedia.org/wiki/File:Ferrosilicium_standard.jpg

Photo credit: Borvan53

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P36 Ferromanganese samples

https://commons.wikimedia.org/wiki/File:Ferromangan%C3%A8se_affin%C3%A9.jpg

Photo credit: Borvan53

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P37 Calcium oxide powder: material illustration, not a certified metallurgical grade

https://commons.wikimedia.org/wiki/File:Calcium_oxide_powder.JPG

Photo credit: Leiem

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P38 Type K thermocouple probe: not a molten-steel disposable probe

<https://commons.wikimedia.org/wiki/File:ThermocoupleProbe.jpg>

Photo credit: User:Harke

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P40 Hot-briquetted direct reduced iron

https://commons.wikimedia.org/wiki/File:Hot-briquetted_iron.JPG

Photo credit: Borvan53

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P42 Lubricating-oil samples

[https://commons.wikimedia.org/wiki/File:Lube_Oil_Sample_Rack_\(8194652377\).jpg](https://commons.wikimedia.org/wiki/File:Lube_Oil_Sample_Rack_(8194652377).jpg)

Photo credit: Chris Hunkeler from Carlsbad, California, USA

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P43 Engine oil filter: family illustration

https://commons.wikimedia.org/wiki/File:Engine_oil_filter.JPG

Photo credit: Dvortygirl

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P44 Electrohydraulic servo valve, product photograph

<https://www.moog.com/products/servo-valves-servo-proportional-valves/industrial/servo-and-proportional-valves-with-electronics/pilot-operated-servo-valves-for-analog-signals-d661-series.html>

Photo credit: Photographie du site officiel

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P45 Steel tubes in Canada: dimensional illustration, not a guaranteed new condition or grade

https://commons.wikimedia.org/wiki/File:Large_steel_tubes,_Etobicoke,_Ontario.jpg

Photo credit: Magnolia677

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P46 Metallurgical probes and samplers, official-site photograph

<https://www.heraeus-electro-nite.com/en/steel/steel-melting-solutions/steel-melting-solutions-eaf/sampling-measurement-technology-for-steel-melting-solutions-eaf/>

Photo credit: Site officiel

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P47 Fuel/water separator product photograph: no maintenance interval inferred from image

https://www.parker.com/content/dam/Parker-com/Online/Product-Images/Engine-Mobile-Original-Equipment-Division/zoom_1000x1000/1000FV10_Racor_Turbine_1000x1000_zm.jpg

Photo credit: Site officiel

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P48 Dolomite specimen: mineralogical illustration, not certified calcined dolomite

https://commons.wikimedia.org/wiki/File:1132_Dolomit_-_Biely_Potok.jpg

Photo credit: Mineralysk

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P50 Hydraulic filter element product photograph: confirm media and reference

https://www.parker.com/content/dam/Parker-com/Online/Product-Images/Engine-Mobile-Aftermarket-Division/zoom_1000x1000/Baldwin_Hydraulic_Filter_Elements_zm.jpg

Photo credit: Site officiel

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P52 Anthracite and coke: carbon-material illustration, qualify grade

https://commons.wikimedia.org/wiki/File:2005-01-28-anthrazit_koks.jpg

Photo credit: Winfried Mueller

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P55 Flanged shaft coupling: family illustration

https://commons.wikimedia.org/wiki/File:733_Coupled_shaft.jpg

Photo credit: Brinki

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P56 Physical cutaway multi-piston pump

https://commons.wikimedia.org/wiki/File:Multiple-piston_rotary_pump_Cut-away_version.JPG

Photo credit: S.J. de Waard

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P57 Hydraulic cylinder — physical cutaway model

https://commons.wikimedia.org/wiki/File:Innsbruck-Hansa_Flex-model_hydraulic_cylinder-01ASD.jpg

Photo credit: Asurnipal

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P59 Gate valve

https://commons.wikimedia.org/wiki/File:6-Moly-Gate_Valve--The-Alloy-Valve-Stockist.jpg

Photo credit: Heather Smith

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P60 Hinged metal expansion joint

<https://commons.wikimedia.org/wiki/File:Hinged-expansion-joint.jpg>

Photo credit: Pipe Supports and Expansion Joints'

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P61 Absolute encoder — dismantled disk and sensor

https://commons.wikimedia.org/wiki/File:Gray_code_rotary_encoder_13-track_opened.jpg

Photo credit: Mike1024

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P62 Modular PLC — CPU and modules

<https://commons.wikimedia.org/wiki/File:S71500.JPG>

Photo credit: Palatinatian

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P63 Industrial 24 V power supply

https://commons.wikimedia.org/wiki/File:Power_Supply_Siemens_SITOP_Power_120334.jpg

Photo credit: Mixabest

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P64 Crimp fittings and hydraulic connector

https://commons.wikimedia.org/wiki/File:Hydraulic_hose_fittings.JPG

Photo credit: Jstapko

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P65 Pressure relief valve — cooling circuit

https://commons.wikimedia.org/wiki/File:Pressure_relief_valve_DN25_on_cooling_water.jpg

Photo credit: RomanM82

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P66 Electric valve actuator

[https://commons.wikimedia.org/wiki/File:2019-05-19_\(360\)_Rotary_drive_for_gate_valve_from_AUMA-Armaturentriebe_Ges.m.b.H._at_Fischwanderhilfe_Donaukraftwerk_Melk,_Austria.jpg](https://commons.wikimedia.org/wiki/File:2019-05-19_(360)_Rotary_drive_for_gate_valve_from_AUMA-Armaturentriebe_Ges.m.b.H._at_Fischwanderhilfe_Donaukraftwerk_Melk,_Austria.jpg)

Photo credit: GT1976

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P67 Variable-frequency drive — control face

https://commons.wikimedia.org/wiki/File:Siemens_VFD.jpg

Photo credit: Sarah Adrita

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P68 Piston hydraulic accumulators

https://commons.wikimedia.org/wiki/File:Kocsis_Tech_80gal_6.5ksi_piston_accumulator.JPG

Photo credit: Brandon Richards

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P69 Globe valve — body and handwheel

https://commons.wikimedia.org/wiki/File:Carbon_steel_globe_valve.jpg

Photo credit: Heather Smith

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P70 Control valve with positioner

https://commons.wikimedia.org/wiki/File:Small_control_valve_with_positioner.jpg

Photo credit: Bitjungle

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P71 Dismantled plate heat exchanger

https://commons.wikimedia.org/wiki/File:Plate_heat_exchanger_-_dismantled_pic01.jpg

Photo credit: RomanM82

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P72 Dismantled emergency-stop button

https://commons.wikimedia.org/wiki/File:ABB_MPET4-10R.JPG

Photo credit: Dmitry G

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P73 Three-pole circuit breaker

https://commons.wikimedia.org/wiki/File:Breaker3phase2a_proc.jpg

Photo credit: Glogger

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P74 Steel wire rope — thimble, eye and termination

https://commons.wikimedia.org/wiki/File:Close-up_of_wire_rope_assembly,_Jardim_da_Fundação_Calouste_Gulbenkian,_Lisbon,_Portugal_julesvernex2.jpg

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P76 Inductive proximity sensor

https://commons.wikimedia.org/wiki/File:Pepperl+Fuchs_inductive_proximity_switch_3RG4113-3AG33-PF.jpg

Photo credit: Lucasbosch

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P78 Externally toothed shaft

https://commons.wikimedia.org/wiki/File:Aussenverzahnung_waelzgestossen.jpg

Photo credit: Dirk Gräfe

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P79 Load cell under a tank leg

https://commons.wikimedia.org/wiki/File:Load_Cell_fitted_under_tank_leg.jpg

Photo credit: GRALISTAIR

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P81 Compressed-air coalescing filters

https://commons.wikimedia.org/wiki/File:Filtry_koalescencyjne_sprężonego_powietrza.JPG

Photo credit: Kdarek561

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P82 Power terminal blocks on a DIN rail

https://commons.wikimedia.org/wiki/File:Transistive_terminals_for_10mm_wires.JPG

Photo credit: Dmitry G

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P83 Industrial Ethernet switch

https://commons.wikimedia.org/wiki/File:Phoenix_Contact_-_Ethernet_Switch.jpg

Photo credit: Mixabest

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P85 Tee fittings — different materials

https://commons.wikimedia.org/wiki/File:T-Stuecke_4052.jpg

Photo credit: Torsten Bätge

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P86 Bolted flanged joint

<https://commons.wikimedia.org/wiki/File:Flansch01.jpg>

Photo credit: Benutzer:Markus Schweiß

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P87 Screw conveyor — equipment during manufacture

https://commons.wikimedia.org/wiki/File:Convoyeur_à_vis_sans_fin_en_fabrication.JPG

Photo credit: Tibs0705

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P88 Welding electrodes and electrode holder

https://commons.wikimedia.org/wiki/File:Arc_welding_electrodes_and_electrode_holder.triddle.jpg

Photo credit: Triddle at English Wikipedia

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P89 Oxy-fuel welding torch

https://commons.wikimedia.org/wiki/File:Horák_na_zváranie_1.jpg

Photo credit: J.Dncsn

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P90 Vernier caliper — close-up of the scale

https://commons.wikimedia.org/wiki/File:Parallaxefreier_Messschieber_Blickrichtung_seitlich_auf_die_Skala.jpg

Photo credit: EckesM

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P91 Mechanical claw puller

https://commons.wikimedia.org/wiki/File:BEARING_PULLER.jpg

Photo credit: Nadinviki

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P92 Differential-pressure level transmitter

https://commons.wikimedia.org/wiki/File:Differential_Pressure_Level_Transmitter.jpg

Photo credit: Bitjungle

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P93 Copper billet mould tube

https://www.kme.com/fileadmin/DOWNLOADCENTER/SPECIAL%20DIVISION/1%20Melting%20&%20Casting/3%20Products/pros_AMT_PP_2021_web.pdf

Photo credit: KME — Advanced Mould Technology

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P94 Copper mould — close-up of the inner surface

https://www.kme.com/fileadmin/DOWNLOADCENTER/SPECIAL%20DIVISION/1%20Melting%20&%20Casting/3%20Products/pros_AMT_PP_2021_web.pdf

Photo credit: KME — Advanced Mould Technology

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P95 Machined copper mould plate

https://www.kme.com/fileadmin/DOWNLOADCENTER/SPECIAL%20DIVISION/1%20Melting%20&%20Casting/3%20Products/pros_AMT_PP_2021_web.pdf

Photo credit: KME — Advanced Mould Technology

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P96 Roller guide — entry rollers

https://www.danieli.com/media/download/img_4172.pdf

Photo credit: Danieli / Morgårdshammar — public guide catalogue

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P97 Machined guide roller

https://www.danieli.com/media/download/img_4172.pdf

Photo credit: Danieli / Morgårdshammar — public guide catalogue

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P98 Ladle slide-gate mechanism — actual installed photograph

<https://www.vesuvius.com/content/dam/vesuvius/corporate/Our-solutions/our-solutions-master-english/iron-and-steel/continuous-casting/ladle-to-tundish/ladle-gates-and-refractory/brochures/2015-Systems-LTC-screen.pdf>

Photo credit: Vesuvius — public LTC system brochure

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P101 High-pressure descaling nozzles

<https://www.lechler.com/de-en/products/metallurgy/nozzles-for-descaling>

Photo credit: Lechler — official descaling-nozzle product photograph

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P102 Graphite electrodes — protected ends

<https://www.graftech.com/productsandservices/default.aspx>

Photo credit: GrafTech — official electrode photograph

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P103 Work rolls — bodies and journals

<https://commons.wikimedia.org/wiki/File:Walzenpaar01.jpg>

Photo credit: Markus Schweiss

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P104 Backup roll — body and journals

<https://commons.wikimedia.org/wiki/File:Walzenpaar01.jpg>

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P106 Pressure gauge — dial and connection

[https://commons.wikimedia.org/wiki/File:Gauges_and_Valves_-_Welding_gas_regulator_\(4093821184\).jpg](https://commons.wikimedia.org/wiki/File:Gauges_and_Valves_-_Welding_gas_regulator_(4093821184).jpg)

Photo credit: Kevin Gessner

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P107 Centrifugal fan — housing and inlet

https://commons.wikimedia.org/wiki/File:High_Pressure_Centrifugal_Fan.jpg

Photo credit: SAF

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P108 Filter bags — detail of the elements

https://commons.wikimedia.org/wiki/File:Bag_filter.jpg

Photo credit: Tetris L

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P109 Tensile-test machine — gripping area

https://commons.wikimedia.org/wiki/File:Machine_traction_walter_bai.JPG

Photo credit: Cdang

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P110 Continuous-casting guide and extraction rolls

https://commons.wikimedia.org/wiki/File:Continuous_casting_strand_Extraction_rolls.png

Photo credit: European Commission, European Coal and Steel Community

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P111 Pneumatic directional-valve manifold

https://commons.wikimedia.org/wiki/File:Festo_History_Valve-terminal.jpg

Photo credit: Festo (Unternehmen)

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P112 Dividing shear blades — machined components

<https://www.knifemaker.com/product-collection/shear-blades/>

Photo credit: American Cutting Edge — official shear-blade product photograph

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P113 Tundish slide-gate plates — photographed batch

<https://www.vesuvius.com/content/dam/vesuvius/corporate/Our-solutions/our-solutions-master-english/iron-and-steel/continuous-casting/ladle-to-tundish/ladle-gates-and-refractory/brochures/2015-SGR-screen.pdf>

Photo credit: Vesuvius — public slide-gate refractory brochure

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P115 Ladle inner and collector refractory nozzles

<https://www.vesuvius.com/content/dam/vesuvius/corporate/Our-solutions/our-solutions-master-english/iron-and-steel/continuous-casting/ladle-to-tundish/ladle-gates-and-refractory/brochures/2015-SGR-screen.pdf>

Photo credit: Vesuvius — public slide-gate refractory brochure

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P116 Ladle slide-gate refractory plate

<https://www.vesuvius.com/content/dam/vesuvius/corporate/Our-solutions/our-solutions-master-english/iron-and-steel/continuous-casting/ladle-to-tundish/ladle-gates-and-refractory/brochures/2015-SGR-screen.pdf>

Photo credit: Vesuvius — public slide-gate refractory brochure

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P117 Iron-ore pellets — close-up of samples

https://commons.wikimedia.org/wiki/File:Iron_ore_pellets_from_Kiruna.jpg

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P118 Gear-pump rotors — mechanical components

https://commons.wikimedia.org/wiki/File:Zahnradpumpe_Werdohler_Pumpenfabrik_01.JPG

Photo credit: Archiumtechnica

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P119 Pneumatic cylinder

https://commons.wikimedia.org/wiki/File:Pneumatic_cylinder.jpg

Photo credit: Grummelbacke

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P120 Lifting hook with safety latch

https://commons.wikimedia.org/wiki/File:Lifting_hook_with_a_safety_latch_hanging_from_a_bridge_crane_-_2.jpg

Photo credit: W.carter

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P121 Ferrovandium sample

<https://commons.wikimedia.org/wiki/File:FerroVanadium.jpg>

Photo credit: Alchemist-hp

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P122 Compressed-air coalescing filter

https://commons.wikimedia.org/wiki/File:Filtry_koalescencyjne_sprężonego_powietrza.JPG

Photo credit: Kdarek561

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P123 Pneumatic quick coupling

https://commons.wikimedia.org/wiki/File:Schnellverschlusskupplung_Serie_LP.JPG

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P124 Lockout station and padlocks

https://commons.wikimedia.org/wiki/File:Lockout_Station_at_National_Synchrotron_Light_Source_II.jpg

Photo credit: Henrysz

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P125 HEPA filter media close-up

https://commons.wikimedia.org/wiki/File:CSIRO_SciencelImage_483_Closeup_of_HEPA_Filter.jpg

Photo credit: Livestock Industries, CSIRO

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P126 High-pressure water plunger pump

https://commons.wikimedia.org/wiki/File:High_pressure_pump_170_kW.jpg

Photo credit: Hammelmann Oelde

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P127 Water pressure-regulating valves

https://commons.wikimedia.org/wiki/File:Pressure_regulating_valves.jpg

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P131 Industrial flexible coupling

https://commons.wikimedia.org/wiki/File:RATO_R_highly_flexible_coupling.jpg

Photo credit: Ricdeaamouse

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P132 Industrial roller chain detail

https://commons.wikimedia.org/wiki/File:Burmeister_%26_Wain_crankshaft_8inch_rollerchain.jpg

Photo credit: TGCP

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P133 Square steel washer

https://commons.wikimedia.org/wiki/File:Din_434.jpg

Photo credit: ARFISA Representaciones, SCP

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P134 Helical compression springs

https://commons.wikimedia.org/wiki/File:Druckfedern_NH-Federn.jpg

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P135 Industrial cartridge fuse

<https://commons.wikimedia.org/wiki/File:200AIndustrialFuse.jpg>

Photo credit: Ali

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P136 Metallographic preparation disc

https://commons.wikimedia.org/wiki/File:Magnetic_disc_system_for_polishing.jpg

Photo credit: Struers A/S

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P137 Hydraulic power unit — installed-unit detail

<https://www.boschrexroth.com/en/us/company/press/media-assets/>

Photo credit: Bosch Rexroth — official press photograph

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Technical and normative references

Public reference documents support the equipment families and standards. They do not identify the supplier selected for a quotation, establish affiliation or prove the manufacture origin of a proposed product. Full URLs are provided for verification. Procurement portals provide public notice access; full subscriber-only tender documents were not used as a complete factory bill of materials.

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T02 Published historical capacities, 2021 release

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T03 Bar and wire rod mills

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T04 Continuous casting of long products

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T05 Steelmaking wear parts and components

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T07 Secondary metallurgy

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T08 Spare parts and consumables service programme

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T18 Metallurgical additives

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T19 Direct reduction: technical context

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T22 Arc/spark spectrometry for metal analysis

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T24 Documented fuel-filter maintenance example

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N02 Electrode and pin dimensions: IEC 60239

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N04 Long-product mill safety: EN 15949

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<https://knowledge.bsigroup.com/products/industrial-furnaces-and-associated-processing-equipment-safety-combustion-and-fuel-handling-systems-1>

N06 Hydraulic safety: ISO 4413

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N08 Hydraulic filter testing: ISO 16889

<https://www.iso.org/standard/77245.html>

N09 Bearing rating life: ISO 281

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<https://store.astm.org/products-services/standards-and-publications/standards/steel-standards.html>

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N12 Process piping: ASME B31.3

<https://www.asme.org/codes-standards/find-codes-standards/b31-3-process-piping>

N13 Valve, testing and pump scopes: API

https://www.api.org/-/media/files/publications/2025-catalog/06_refining_2025.pdf

N14 Pipeline valves: API 6D

https://www.api.org/-/media/files/publications/whats%20new/6d_e24%20pa.pdf

N15 API programme product categories

<https://www.api.org/products-and-services/api-monogram-and-apiqr/program-documents>

N16 Inspection documents: EN 10204

<https://knowledge.bsigroup.com/products/metallic-products-types-of-inspection-documents>

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N18 Motors: IEC 60034-1

<https://webstore.iec.ch/en/publication/112762>

N19 Transformers: IEC 60076-1

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N20 Drives: IEC 61800-5-1

<https://webstore.iec.ch/en/publication/62103>

N21 Programmable controllers: IEC 61131-2

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N29 IEC 61000: electromagnetic compatibility

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<https://bomop.anep.dz/>

R02 Public notices: full documents restricted to subscribers

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