Appendix 3 [Description] of materials list (materials with high frequency of use)

Highly alloyed steel [Specific examples] *This table is written in JIS(Japanese Industrial Standards)

- JIS G4305：Stainless steel (SUS-Series)
- JISZ2550：Sintered metal materials (P,SMF,SMK-Series)
- JIS G4312,JIS G5122,etc：Heat-resistant steel (SUH-Series)

[Description]

An alloy steel means modified steel or steel to which more than one alloy element is added in order to obtain characteristics for specific purposes. Specifically, a high-alloy steel means an alloy steel which contains alloy elements over 10 weight percent(wt%) in total.

So-called stainless steel is a high-alloy steel with iron as the main constituent to which approximately 10.5(wt)%(JIS G0203 simply defined based on 10.5%) or more of chrome is added.

ISO uses mass percent (mass%), which is essentially the same as weight percent (wt%). Since AIS and other data formats in other Industries use wt%, wt% is used for expressing percentages.

(Reference：ISO4948-4：1982 and 4948-2：1981)

Highly alloyed cast iron [Specific examples]

- JIS G3214：Stainless steel forgings (SUS F-Series)
- JIS G5121：Stainless steel castings (SCS-Series)
- JIS G5122：Heat-resistant steel,Heat-resisting cast alloys (SCH-Series)

[Description]

This category includes iron alloys which contain nickel (Ni), chrome (Cr), molybdenum (Mo) and other composition metals over 10 wt% in total and also contain carbon in the proportion of 2.14 wt% to 6.67wt%. Having a low melting point, they are used for the casting of molten metal into a mold.

Unalloyed steel and low alloyed steel [Specific examples]

- JIS G4804：Sulfur and sulfur compound free cutting steel (SUM-Series)
- JIS G4053：Low-alloyed steels for machine structural use (SMn、SNC、SMnC、SCr、SNCM、SACM-Series)
- JIS G3141：Cold rolled steel plate (SPCC,SPCD,SPCE,SPCF,SPCG--Series)
- JIS Z2550：Sintered metal materials－Specification（non-alloy and low-alloy steel and oil-impregnated bearings including）
- JIS G3507：Cold forging carbon wire (SWCH-Series)
- JIS G4801：Spring steel (SUP-Series)
- JIS G3131：Hot-rolled steel plate (SPHC,SPHD,SPHE,SPHF-Series)
- JIS G3560：Oil tempered wire for mechanical springs(SWO-Series)
- JISG4802：Cold-rolled steel strip for springs (S,SK,SUP-Series)
- JIS G3502：Piano wire rods (SWRS-Series)
- JIS G4107：Alloy steel bars for bolting materials(SNB-Series)
- JIS G3311：Cold rolled special steel strip (S,SK,SKS,SNC-Series)
- JIS G3222：Nickel-chromium-molybdenum steel (SNCM-Series)
- JIS G3123：Cold finished carbon and alloy steel bars (SGD-Series)
- JIS G3444：Carbon steel tubes for general structure (STKM-Series)
- JIS G4051：Carbon steels for machine structural use (S-Series)
- JIS G3101：Rolled steels for general structure (SS-Series)
- JIS G3521：Hard drawn steel wires (SW-Series)
- JIS G3506：High carbon steel wire rods (SWRH-Series)
- JIS G4401：Carbon tool steels (SK-Series)
- JIS G3444：Carbon steel pipe (STK-Series)
- JIS G3201：Carbon steel forgings (SF-Series)
- JIS G5101：Carbon steel castings (SC-Series)
- JIS G3532：Low carbon steel wires (SWM-Series)
- JIS C2504：Soft magnetic irons (SKA,SUY-Series)
- JIS G3505：Low carbon steel wire rods (SWRM-Series)
- JIS G3132：Hot-rolled carbon steel strip (SPHT-Series)
- JIS G3460：Steel tubes for low temperature service (STPL-Series)
- JIS G3452：Carbon steel pipes for ordinary piping (SGP-Series)

[Description]

Unalloyed steel that does not follow the alloyed steel definition. Low alloyed steel that consists of alloy elements below 10 weight percent(wt%) in total. Refer to the above and ISO4948-1 and 4948-2.

Cast aluminum alloys [Specific examples]

・JIS H 5302：Aluminium alloy die castings (ADC,AlMg9,AlSi,Al-Series)

・JIS H5202：Aluminium alloy castings (AC-Series)

・JIS Z3232：Aluminium and aluminium alloy welding rods and wires (A-Series)

[Description]

This category includes gravity-cast or die-cast aluminum and alloys with aluminum as the main constituent. Because pure aluminum is a soft metal, it is alloyed with copper, manganese, silicon, magnesium, zinc, nickel, etc.

Wrought aluminum alloys [Specific examples]

・JIS H4000：Aluminium and aluminium alloy sheets, strips and plates (A-Series)

・JIS Z3263：Aluminium alloy brazing filler metals and brazing sheets (A-Series)

・JIS H4080：Aluminium and aluminium alloys extruded tubes and cold-drawn tubes (A-Serie)

・JIS H4170：High purity aluminium foils (A1N-Series)

[Description]

This category includes forged aluminum and alloys with aluminum as the main constituent. The forging procedure consists of applyingpressure to metal by hammering it, compressing voids in the metal, refining the crystals, and aligning them in the same direction, thereby increasing the metal's strength.

Because pure aluminum is a soft metal, it is alloyed with copper, manganese, silicon, magnesium, zinc, nickel, etc.

Copper：e.g. copper in cable harnesses [Specific examples]

・JIS C2801：Commutator bars (CMB-Series)

・JIS H3510：Oxygen free copper sheets, plates, strips, seamless pipesand tubes, rods, bars and wires for electron devices (C1011,C1020,C1100,C1201,C1220,C1221-Series)

[Description]

Since it has the highest electrical conductivity after silver and it is relatively inexpensive, copper is often used as electric wires and cables. Only the conductive function needs to be taken into account.

Copper alloys (including brass) [Specific examples]

・JIS H5120Copper and copper alloy castings
(CAC-Series,Aluminum bronze casting,Silicon bronze casting,
Bismuth-selenium bronze casting,Bismuth bronze casting,Phosphor bronze casting,Brass cast high tensile brass casting,
Bronze castings,etc)

・JIS H3100,JISH 3250,JIS H3270,JIS H3110,JIS H3130,JIS H5120,JIS H5121,etc：Copper and copper alloys (C-Series)

・JIS Z2550：Copper Sintering Parts (P-Series,With oil-impregnated bearing)

[Description]

This category includes alloys with copper as the main constituent, namely, cupronickel or an alloy of copper and nickel, an alloy of aluminum and copper, brass or an alloy of copper and zinc, and bronze or an alloy of copper and tin.

Cadmium copper alloy, chrome copper alloy, teryllium copper alloy, beryllium copper alloy and other high-purity copper alloys containing traces of additional elements are also used for industrial purposes.

Zinc and zinc alloys [Specific examples]

・JIS H5301：Zinc alloy die castings (ZDC-Series)

[Description]

This category includes zinc and alloys with zinc as the main constituent. Since brass for practical purpose contains zinc in a proportion of less than 45%, brass shall be regarded as a copper alloy.

Nickel and nickel alloys [Specific examples]

・JIS G4902：Corrosion-resisting and heat-resisting superalloy plates and sheets (NCF-Series)

・JIS C2520：Wires and rolled wires for electrical heating (NCHRW,NCHW-Series)

・JIS C2523：Oxidized Copper－Nickel Alloy Wires for Electrical Resistance Use (OCNW-Series)

[Description]

This category includes nickel and alloys with nickel as the main constituent. Since nickel coins are made of cupronickel containing copper (75%) and nickel (25%), they shall be regarded as a copper alloy.

Lead and lead alloys [Specific examples]

・JIS H5601：Hard Lead Castings (HPbC8,HPbC10-Series)

[Description]

This category includes lead and alloys with lead as the main constituent.

Sn-Pb solder [Specific examples]

・JIS Z3282：Soft solders (63A/Sn63Pb37-Series)

・JIS Z3282：Soft solders<solder erosion resistant type> (H62Ag2A/Sn62-Pb36-Ag2-Series)

[Description]

This category includes solders of lead-tin alloys, used in large quantities for mounting electronic components on electronic print circuit boards. Specifically, they are high-melting-point solders or those with a lead content of over 1000ppm.

Lead-free solders [Specific examples]

・JIS Z3282：Lead-free solders ("A30C5/Sn96.5-Ag3-Cu0.5"-Series)

・JIS Z3282：Lead-free solders<Tin - Copper type> ("C7/Sn99.3-Cu0.7"-Series)

・JIS Z3282：Lead-free solders<Low silver type> ("C7A3/Sn99-Cu0.7-Ag0.3"-Series)

[Description]

This category includes solders which do not contain lead at a level such that is not regarded as an impurity. JIS Z 3282 (Soft solders--Chemical compositions and forms) sets the maximum lead content at 0.10wt% (1000ppm). Substantially, this category

Special metals (gold)

This category includes gold and alloys with gold in a proportion of 75% or more.

[Description]

The semiconductor used in combination with the internal electrical connection lines.

Special metals (platinum and rhodium)

[Description]

This category includes platinum and rhodium. They are used as catalysts in automobile-related parts.

In the case that a specialty metal is applied in the form of a carrier supporting a small amount of the metal, the material of the carrier should be taken into account for the classification.

In the case that the carrier is activated carbon or alumina, it should be classified as a ceramic.

(If small amounts of platinum and palladium are described as voluntary declarable substances, recipients may be glad.)

Other nonferrous metals

[Description]

Although the term generally means metal materials other than iron and steel materials (i.e., iron and alloys with iron as the main constituent), some of them are included in other categories in this classification.

Thus, this category shall include nonferrous metals other than aluminum, copper, nickel, lead, and precious metals (as classified above). Silicon and GaAs fall into this category because they can be regarded as metalloid or metalloid alloy.

Ceramics

[Description]

The term is narrowly defined as a substance, with metal oxide as the basic constituent, sintered by heat treatment at high temperatures.

Based on the production method, glass could be regarded as a ceramic.

Therefore, this category shall include those containing crystalline elements.

Glass

[Description]

The term means an amorphous solid which exhibits glass transition phenomenon at elevated temperatures.

It also means a substance which becomes such a solid. This solid state is called a glass state.

It possesses rigidity as high as that of crystals and also possesses extremely high viscosity.

An amorphous material which is soft like rubber is not called a glass. This category excludes organic glasses such as amorphous polymeric materials and includes inorganic glasses.

Other inorganic compounds

[Description]

This category includes substances, such as oxides, nitrides, and nitrates, obtained by chemical combination of a metallic base. As a matter of convenience, this category may include inorganic materials which are difficult to classify as metal, glass or ceramics.

Diamond and graphite are composed of carbon, and they are nonrecyclable crystalline materials. As a matter of convenience, they are included in this category.

PVC

[Description]

This refers to a resin materials mainly consisting of a polymer obtained by polymerizing vinyl chloride (chloroethylene). There are two types of such resins: soft vinyl chloride resin containing a large amount of plasticizer and hard vinyl chloride resin containing only a small amount of plasticizer.

PC

[Description]

This refers to a resin materials mainly consisting of a polymer having a carbonate group (-0-(C=0)-0-) for inter-monomer bonding. Although carbonate (carbonic ester) may be regarded as a kind of polyester, it shall be sorted out from bisphenol-A polycarbonate used for general purposes.

POM

[Description]

This refers to resin materials mainly consisting of a polymer with oxymethylene (-CH2O-) as the unit structure. Like 1,3,5-trioxane (metaformaldehyde), it is a polymer of formaldehyde. There are two types of this polymer: homopolymer ([-CH2O-]n, paraformaldehyde) obtained by polymerizing formaldehyde only, and copolymer ([-CH2O-]n[-CH2CH2O-]m) containing oxymethylene (-CH2CH2O-) in a proportion of up to about 10 mol percent. Since both of them are treated as polyacetal or acetal resin, they shall be included in this category.

ABS A(B)S

[Description]

This refers to resin materials mainly consisting of a copolymer of acrylonitrile, (butadiene), and styrene. There are two methods of producing it: a ternary polymerizing technique by reaction of acrylonitrile, latex, and styrene; and a blending technique for compounding AS resin, rubber and additive in a mixer.

PET

[Description]

This refers to resin materials mainly consisting of a crystalline thermoplastic polymer, which is a kind of polyester made of ethylene glycol and terephthalic acid. A similar polymer called polybutylene terephthalate (PBT) exists, but it shall be included

Filled thermoplastics

[Description]

This category includes thermoplastic resins containing fibers such as carbon fiber and glass fiber and/or powders such as talc in a proportion exceeding 5 weight percent. The filler concentration which would prevent the blended material from being

Other thermoplastic resins

[Description]

This category includes thermoplastic resins other than those mentioned above. It includes polymer alloys and blended resins.

PU(Polyurethane)

[Description]

This refers to resin materials mainly consisting of a high molecular compound obtained by copolymerizing monomers in the urethane bond formed by the condensation of an isocyanate group and an alcohol group.

Thermoplastic polyurethane exists, too, and may be included in this category. Its abbreviation for the plastics classification is PUR.

Unsaturated polyester

[Description]

This is not a polymer formed by the condensation polymerization of monomers connected by an ester bond, like PET and PBT, but is a resin material mainly consisting of a reactant or a polymer substance of a monomer (unsaturated polyester) containing different allyl groups or vinyl groups in an ester bond.

Monomeric drugs before being subjected to the reaction or polymerization are also called unsaturated polyesters, but they are not included in this category. ((Mixing agents)

EP(Epoxy resin)

[Description]

This resin material mainly consists of a cured epoxide polymer resin that can be hardened by graft polymerization and crosslinking at its many epoxy groups when mixed with a catalyst or hardener.

This is regarded as a reactant because it can be used for practical purposes when thermally hardened as a result of mixing with a prepolymer before graft polymerization and a hardener.

Prepolymers are also called epoxy resin, but they are not included in this category. ((Mixing agents)

Other cured resinsOthers

[Description]

This category includes cured resins other than those mentioned above (They are polymeric materials with a linear three-dimensional structure which becomes softer when heated and can be solidified through a chemical reaction. Once heated and solidified, this plastic material never melts even when heated again.)

"Not thermoplastic" Elastomer/Elastomer composites

[Description]

This category includes natural rubber and synthetic rubber with a bridge structure, and composites consisting of such rubber.

High molecular composites (e.g., indecomposable laminated trim component)

[Description]

This category includes cured-resin-based composites such as FRP. It generally includes cured resins containing fibers and inorganic fillers.

Resins/fibers contained in high molecular composites

[Description]

Although resins and fibers contained in high molecular composites can be classified separately, they need not to be classified because high molecular composites are reported as homogeneous material included in parts of articles.

Wood

[Description]

This term refers to for tree trunk-derived materials used for various purposes.

This category includes not only solid wood but also wood-based materials such as plywood and wooden boards.

Paper

[Description]

This refers to thin, flat materials produced by pressing together plant fibers or the like.

The Japanese Industrial Standards (JIS) define paper as “material produced by conglutinating plant fibers and other kinds of

Fiber

[Description]

This term refers to thin, flexible and cohesive strings which grow naturally or are artificially extruded, such as animal hair and those obtained from animal leather and plants.

Leather

[Description]

This category includes animal leather and its processed goods, excluding synthetic leather, artificial leather and other artificial materials simulating leather in form.

Liquids (ink, fat and oil, etc.)

[Description]

This refers to materials which stay in a liquid state at SATP(standard ambient temperature and pressure, 25 °C (59 °F) and 100.000 kPa) and are mainly utilized in that state. This category includes inks, lubricants, brake fluid, greases, etc.

Other materials (powder, etc.)

[Description]

This category does not specify any properties of the materials included in it.

It includes materials contained in an article in a powder state, such as toners in toner cartridges and fire extinguisher powder.

Plating

[Description]

Explanation regarding each metal species is omitted here.
Plating means a surface treatment or its process of coating a surface of metal or other materials with thin metal layers while being submerged.
There are several plating techniques such as electroplating, electroless plating and hot-dip plating.

Trivalent chromate treatment

[Description]

Trivalent chromate is a form of processing generally applied after galvanization, in order to form a thin coating of trivalent chrome or chromate, thereby providing corrosion resistance.

Chrome-free treatment

[Description]

This category includes materials which should not be disclosed in detail.

Alumite treatment

[Description]

This is a collective term for the techniques used to oxidize aluminum, which serves as an anode in an electrolytic process in strong acidic water, thereby coating the metal. It is also called anodic oxidation.

Alumite coating treatment

[Description]

For aluminum sashes and other members used in a corrosive environment, the method of combined coating of anodic oxide and organic films is used.

Aluminum anticorrosion treatment

[Description]

This refers to an anticorrosion treatment for aluminum excluding alumite.

Blackening (triiron tetroxide) treatment

[Description]

This is a process of forming a triiron tetroxide coating on a product. In the process, a solution of thick sodium hydroxide mixed with a reaction accelerator and a dye is heated and boiled up to around 140℃ and the degreased and derusted product is

Phosphate treatment

[Description]

This treatment protects the surface of a metal (mainly iron) by forming layers of various phosphate compounds over the

Coated resins

[Description]

This refers to resins coated by spray coating, electrostatic coating, electrodeposition coating, powder coating, etc. Printed ink and toner may be included in this category.

Coating (ceramics)

[Description]

Ceramic coating, excluding chromium nitride, DLC and titanium nitride

Coating (glass)

[Description]

Coating such as silicate treatment

Coating (other composites)

[Description]

Coating with a combination of different materials, other than those mentioned above. No [Specific examples] are given.