金属铁丝和网制品相关英语词汇

铁：iron
铁棒：pontil
铁笔：stencil pen
铁饼：discus
铁铲：shovel
铁锤：hammer
铁索：iron chain
铁桶：metal pail
铁绣：rust
铁屑：scrap iron
acid Bessemer cast iron 酸性转炉铸铁
acid proof cast iron 耐酸铸铁
all-mine pig iron 不用冶炼的生铁
alloy iron 铁合金
alloy cast iron 合金铸铁
angle iron (with equal sides) (等边)角铁
antifriction cast iron 抗磨铸铁
Armco iron 阿姆克铁(工业纯铁)
arsenic iron 毒砂、砷铁矿，砷化铁
austenitic cast iron 奥氏体生铁
back iron (刨刀的)护铁
ball iron 结核铁矿
barking irons [美俚]手枪
basic iron 碱性铁
beak iron 鸟嘴钻，丁字钻
Bessemer pig iron 酸性转炉生铁，贝氏生铁
black sheet iron 黑钢皮
black -heart malleable iron 黑心可锻铸铁
blast-furnace cast iron 高炉生铁
bloomery iron 熟铁块
box iron 槽钢，槽块
burnt iron 过烧钢[铁]
bushelled iron 熟铁
calking iron 密缝錾
carbonyl iron 羰基铁
cast iron 生铁，铸铁
channel iron 槽钢[铁]
checkered iron 网纹钢
chilled cast iron 冷硬铸铁
chromic iron 铬铁矿
chromium irons 铬铁合金
cinder pig iron 夹渣生铁
coarse indented cut plating iron 粗牙槽刨刀

coke pig iron 焦炭生铁
cold blast pig iron 冷风生铁
conversion iron 炼钢生铁
core iron 型心铁
corner iron 角钢[铁]
angle iron 角钢[铁]
edge iron 角钢[铁]
corrugated iron 瓦楞铁[钢]皮
undulated sheet iron 瓦楞铁[钢]皮
roofing iron 瓦楞铁[钢]皮
corrugated iron 陨铁
roofing iron 陨铁
undulated sheet iron 陨铁
cramp iron 两爪钉, 铁钩, 把钩
cupola mallealle iron 化铁炉可锻铸铁
dephosphorized pig iron 脱磷生铁
dicyclopentadienyl iron 二茂铁
dog iron 两爪铁扣, 铁钩
double iron 工字钢[铁]
H-Shaped iron 工字钢[铁]
double plane iron 带护铁的刨刀
double refined iron 二重精炼铁
double-double ironsheet 叠轧铁板, 板轧制的黑钢皮
dry iron 低硅生铁
dual edge trimming iron 双片边刨刨刀
ductile cast iron 球墨铸铁
nodular cast iron 球墨铸铁
spheroidal graphite cast iron 球墨铸铁
dug iron 熟铁, 锻铁
knobbled iron 熟铁, 锻铁
wrought iron 熟铁, 锻铁
electric iron 电熨斗
electric pig iron 电炼生铁
electric solding iron 电烙铁
electrolytic iron 电解铁
embossing iron 压花铁
enamelled iron 搪瓷铁
fassioned iron 型钢
figured iron 型钢
profiled iron 型钢
sectional iron 型钢
shape iron 型钢
fibrous iron 纤维断口铁
fine indented cut plating iron 细牙槽刨刀

flat hoop iron 平箍钢
floor iron 底铁
fluted bar iron 凹面方钢
foundry (pig) iron 铸造生铁
free iron 游离铁
fresh iron 初熔铁
girder iron 梁钢, 梁铁
glazy pig iron 高硅生铁
grab iron 铁橇棍
graphitic pig iron 灰口铁
gray cast iron (=grey cast iron, gray pig iron) 灰口铸铁
heavy iron 厚度层热浸镀锌铁皮
hematite pig iron 低磷生铁
ingot iron 锭铁, 低碳钢
inoculated cast iron 孕育铸铁
knee iron 隅铁, 曲铁
knotted bar iron 竹节钢
machine cast pig iron 可切削铸铁
manganese iron 锰铁
marking iron 打号冲具, 印记冲头
medium indented cut plating iron 中牙槽刨刀
meehanite cast iron 加制[密烘]铸铁
metallic iron 精炼铁
mirror iron 镜铁
specular pig iron 镜铁
spiegel iron 镜铁
mollealle iron 可锻铸铁
moving iron 软铁
nail iron 制钉铁
nickel cast iron 不锈镍铸铁
nickel white iron 镍白口铁
off(-grade) iron 号外铁, 不合格铁
open-hearth iron 平炉生铁
pearlitic iron 珠光体铸铁
plane iron 刨刀, 刨铁
profiled sheet iron 成型薄钢板
quardrant iron 方钢[铁]
square bar iron 方钢[铁]
rapping iron 起模棒
reactive iron 电抗铁(附加在变压器或电抗器中, 以加大电抗)
ribbon iron 带钢[铁]
riffled iron 网纹铁板
rustless iron 不锈钢
stainless iron 不锈钢

scrap iron 废铁
waste iron 废铁
short iron 脆性铁
silicon iron 硅钢
sow iron (高炉)沟铁
spathic iron 菱铁矿
specular iron 辉赤铁矿，镜铁矿
sponge iron 海绵铁
spongy iron 海绵铁
straight grooving iron 直槽刨刀
structural iron 结构钢
structure iron 结构钢
sweat iron 焊铁
tinned iron 镀锡铁板[皮]
titanic iron 钛铁矿
tooth plane iron 梳形刨刀
trying cut plating iron 光刨刨刀
twist iron 铰钳
very open-grained pig iron 伟晶生铁
waffle iron 对开式铁心
white iron 白心铁
young iron 糊状搅炼铁
acetate wire 醋酸绝缘线
active wires 有效导线
actuating wire 开动线，动作线
address wire 地址线
address read wire 地址读出线
aerial wire 天线架空线
air wire 天线架空线
Aldrey wire (铝中加入铁、锰、硅经过持续热处理制成的一种)铝合金线
alignment wire 准线
alloy structural steel wire 合金结构钢丝
aluminium alloy wire 铝合金线
aluminium clad wire 包铝钢丝(双金属线)
alumite wire 防蚀铝线
ampere wires 安培导线，电流导线
anchoringwire 锚固索
annealed copperwire 软铜线
annealed aluminumwire 退火铝线，软铝线
armo(u)red cable wire 铠装电缆钢丝
armo(u)ring wire 铠装电缆用钢丝
asbestos covered wire 石棉包线
axle wire 中轴线
back born wire 反生线

bag tie wire 捆扎用丝(锁口丝)
ball-bearing wire 滚珠轴承钢丝, 滚珠用钢丝
bare wire 光焊丝
bare copper wire 裸铜线
bimetallic wire 双金属线
black (drawn) wire 黑钢丝(退火的或退火但未酸洗的线材)
blue annealed wire 发蓝钢丝
bolt wire 螺栓钢条
bonded wire 粘合漆包线
bonding wire 接合线, 焊线
bookbinder wire 【刷】装钉钢丝
border wire (混凝土钢筋和家俱弹簧的)绑接钢丝
bottom wire 下网
brace wire 线拉条
bracing wire 拉索, 拉线, 拉铁丝
braided wire 编(织)线
brass-plated steel wire 镀黄铜钢丝
brazing wire 铜焊线
bridle wire 绝缘跨接线, 跳线
bright wire 光亮钢丝,光面线
bright annealed wire 光亮退火钢丝
bright ground wire 银亮磨光钢丝
bullet wire 中碳钢丝
bunch wire 绞合线, 多绞线
buried wire 埋地电线
bus-bar wire 汇流排, 母线
cable wire 钢丝绳,电缆心线
cable suspension wire 电缆悬挂线
cadmium copper wire 镉铜合金线, 强抗张力导线
carbon structural wire 碳结构钢丝
carrier wire 载波电缆, 载波线
cathode lead wire 阴极引线
centralized traffic control code wire 调度集中电码线
chrome wire 铬线
chrome-nickel wire 铬镍线
chromium-copper wire 铬铜线,铬铜合金线
clipped wire (用冷拔钢丝切碎的)金属粒, 钢丝粒
chopped steel wire (用冷拔钢丝切碎的)金属粒, 钢丝粒
coarse wire 粗拔钢丝(采用皂粉润滑并一次拉成)
code wire 隔离导线, 标准线号导线
cold-heading wire 冷镦钢丝
cold-rolled steel wire 冷轧钢丝
common-strength steel wire 普通强度钢丝
compact-stranded wire 压紧多股绞合线

component wire (电缆)芯线
composite wire 双金属丝
compound twisted wire 合成绞线
conducting wire 导线, 传导线
copper binding wire 铜包线
copper-clad covered steel wire 包铜钢线
copper weld steel wire 铜焊钢线, 铜焊钢丝
core wire 焊心
cord solder wire [松香]心焊锡线
cotton-covered wire 纱包线
cotton covered enamel wire 纱包漆包线
covered wire 绝缘线,被复线, 包线
cross wire 十字交叉线,十字丝
damping wire 减振拉筋, 阻尼拉筋
dead wire 不载电导线
dead-drawn wire 多次(大压缩量)拉拔钢丝, 强拉钢丝
detective wire 铅封铁丝
dielectric wire 介质波导管
distribution wire 配电线路
double-contact wires 双接触导线
double-cotton-covered wire 双纱包[铜]线
double dight wire 【计】双位线
double galvanized wire 加厚锌层镀锌钢丝
double-silk covered wire 双丝包线
drag wire 阻力张线
drain wire 加蔽线,排扰线
drawing-in wire 电缆牵引线
drawn wire 拉制钢丝
drive wire 激励线圈
drop wire 停经片
duplex wire 双心导线
earth wire 地线,接地线
electrical aluminium wire 导电铝线, 铝导线
electrode wire 焊条钢丝
electro-galvanized steel wire 电镀锌钢丝
enamel covered wire 漆包线
enamel insulated wire 漆包绝缘线
enamel slik-covered wire 丝包漆包线
enamelled wire 漆包线
endless wire 无端铜网
exploding wire 爆丝
extension wire 补偿导线
extra special improved plough steel wire 超级制绳钢丝
eyelet wire 带环线

faller wire 下垂线
feeder messenger wire 馈电吊线, 馈电悬缆线
fiber-glass braided wire 玻璃丝编织线
fibre-insulated wire 纤维绝缘线
field wire 被覆线
fire wire 火线,带电[有电]线
fire-resistant wire 耐火导线
fish wire 电缆牵引线
fishing wire 牵引线
flat wire 扁钢丝
flattened wire 压扁丝
flexible wire 软线, 花线
flexible shaft wire 软轴用钢丝
flexible stranded wire 软性绞合线
fly wire 【建】板缝盖网
formale copper wire 聚乙烯铜线
formal insulated wire 聚乙烯绝缘线
four-core wire 四芯线
fourdrinier wire 长网线
free cutting steel wire 易切削钢丝
fretwork saw blade wire 钢丝锯条用钢丝
fully-galvanized wire 全镀锌钢丝
fuse wire 保险丝, 熔丝
safty wire 保险丝, 熔丝
fuselage truss wire 机身构架拉线
galvanized iron wire 铅丝,镀锌铁丝
galvanized stranded wire 镀锌钢绞线
garnett wire 锯齿钢丝, 钢刺条
gauze wire 细目丝网
gear measuring wire 齿轮测量线
generator lead wire 发电机导线
glazed wire 漆包线
gold bonding wire 金连接 线, 金键合线
goldclad wire 镀金导线
gold-plated kovar wire 镀金科伐线
grid lead wire 栅极引线
ground wire (接)地线;避雷线
ground steel wire 磨光钢丝
guard wire 安全线
guide wire 尺度[定距]索,准绳
knotted wire 尺度[定距]索,准绳
measuring wire 尺度[定距]索,准绳
guy wires 张索; 长绳
hair wire 游丝

half-round iron wire 半圆铁线
halfround steel wire 半圆钢丝
hard drawn wire 冷拉线, 硬拉线
hard-drawn aluminium wire 硬铝线
hard-drawn copper strand wire 硬铜绞线
heater wire 加热线
heavy wire 粗钢丝
heavy ga(u)ge wire 粗导线
hexagonal (steel) wire 六角钢丝
high alloy steel wire 高合金钢丝
high-temperature hook-up wire 高温安装线
high-tensile steel wire 高强度钢丝
high tension wire 高压电线; 高强度铁线(加固货物装载)
holding wire 测试线
hollow wire 管状线
hollow copper wire 空心铜线
hook-up wire 架空电缆,电路耦合接线
horizontal wire 横丝
horn wire 喇叭线
hose armo(u)ring wire 铠装胶管(用)钢丝
hot wire 热线, 热丝
hot-dip galvanized steel wire 热镀锌钢丝
hot drawing wire 热拉钢丝
ideal wire 理想导线, 尤勒卡导线(铜镍合金丝)
inclined wire 斜网
indented pre-stressed concrete steel wire 预应力混凝土结构用刻痕钢 丝
india-rubber wire 橡胶绝缘线
induced wire 感应电路
information wire 信息线
information-carrying wire 信息传递线
inhibit wire 禁止线
inner wire 内部钢丝(钢丝蝇中的),内索
insulated alumin(i)um wire 绝缘铝线
iron wire 低碳钢丝
jumper wire 跳线; (架空线路的)跨接线
killed wire (机械处理过的)去弹性钢丝
kovar wire 科伐丝
lacing wire 拉筋, 拉金, 系索
lacquered wire 漆包线
laid wire 直纹网
landing wires 降落张线
lashing wire 拉金, 拉筋, 束缚线
lay wire 模网
lead covered wire 铅包线, 铅皮线

lead fuse wire 保险铅丝
lead-in wire 引入线
leading-out wire 引出线
leg wire 脚线
Litz(endraht) wire 编织线，绞合线，(由细漆包芯线绞成)
live wire 载电线，火线；[喻]生龙活虎的人，精力充沛的人
locking wire 锁线，锁紧用钢丝
long crimp wire 斜纹铜网
loop wire 环线，回线
low alloy steel wire 低合金钢钢丝
lower wire 下网
manganin wire 锰铜线
magnetic wire 录音钢丝
magnetic plated wire 镀磁线
magnetic recording wire 磁性录音钢丝
main shear wire 主剪力线
manufacturer's wire 钢丝制品用钢丝
mattress netting steel wire 钢丝床用钢丝
measuring slide wire 测量用滑触电阻线
merchant wire 钢丝制品
mesh wire 金属网线
messenger wire 悬缆线，承力吊索，吊线
metal-shielded wire 金属屏蔽线
mild drawn wire 软拉钢丝
molybdenum wire 钼丝
monitoring wire 监听线，监视线路
monocrystalline wire 单晶丝
monometallic wire 单金属线
music wire 琴用钢丝
negative wire 电源负极引线
netting wire 网钢丝
neutralizing wire 中和线
nichrome wire 镍铬合金线，镍铬电热丝
nichrome resistance wire 镍铬电阻线
nickel chrome wire 镍铬丝
nickel plated steel wire 镀镍钢丝
nickel steel wire 镍钢丝
normal control wire 定位控制线
normal indication wire 定位表示线
oblong steel wire 矩形钢丝
oil temper wire 油回火钢丝
open wire 明[裸]线
bare wire 明[裸]线
order wire 传号线，联络线，记录线，挂号线(电话)

oval wire 椭圆钢丝
overhead wire 高架电线
overhead earth wire 架空地线
overhead pround wire 架空地线
overspun wire 缠弦
paraffin wire 浸蜡线
paraffin copper wire 浸蜡铜线
party wire (电话)合用电线
patented (steel) wire 铅淬火钢丝
phosphor-bronze wire 磷青铜线
piano wire 钢琴(钢)丝
pickled steel wire 酸洗钢丝, 酸浸钢线
pick-up wire 吸起线
pilot wire 领示线,电缆附线
pinion wire 小齿轮线坯
plastic-insulated wire 塑料绝缘线
plate wire 镀线
plated wire 镀磁线, 磁膜线
platinum wire 铂丝, 白金丝
plug wire 插线
polyethylene insulated wire 聚乙烯绝缘线
polyvinyl chloride drop wire 聚氯乙烯(用户)引入线
positive wire 正极导线
primary wire 原(初级)电路
priming wire 撞针
private wire 专用线
pull wire 拉线, 牵引线
radio wire 绞合天线
rectangular aluminum wire 矩形铝线
reinforcement wire 预应力钢丝
reinforcing wire 钢(筋)丝
release wire 释放线
reverse control wire 反位控制线
ring wire 塞环线
rolled (steel) wire 盘条, 铁丝盘,辊轧钢丝, 卷铁丝
rope stranded wire 多股绞合线
round core wire 圆形心线
rubber-insulated (copper) wire (铜芯)橡胶绝缘电线
rubber sheathed wire 橡胶外包线
rural distribution wire 农村电话线
safety wire 保险丝
satellite order wire 卫星联络线
scrap wire 废线
screen wire 网线

screening wire 屏蔽线
seal wire 铅封丝
sealing wire 焊接线，密封引线，封装用线
section wire 异形钢丝
selection wire 选择线
semihard-drawn aluminium wire 半硬铝线
sense wire 读出线
service wire 引入线
sheathed wire 铠装线，金属护皮电线
sheet wire 扁线
shielded wire 屏蔽线，隔离线
sighting wire 照准丝
silk-and-cotton-covered insulated wire 丝棉包线
silver jacketed wire 镀银线
skinned wire 裸线
sleeve wire 套线,塞套引线
slide wire 滑(触电阻)线
slow-burning wire 慢燃线，耐火绝缘?
small-gauge wire 细钢丝
smoothly surfaced steel wire 光面钢丝
snake wire 绳索包皮线
soft-annealed wire 软金属线
soild wire 单线，实线，单股线
solder-coverred wire 锡包[皮]线
sounding wire 测深绳[索]
span wire 悬索
sodium wire 钠线
special cross section steel wire 特殊断面钢丝
special improved plough steel wire 特号(制绳)钢丝
spoke wire 辐条钢丝，辐线
stadia wire 准距线,视距丝
stagger wire 倾角线
static wire 导电丝
stay wire 系紧线，拉线
steel-cored alumin(i)um wire 钢芯铝线
steel-cored copper wire 钢芯铜线
steel guy wire 钢拉线
steel reinforced aluminium wire 钢芯铝线
stick wire 保留线，自闭线
stone (dead) wire 软钢丝，退火钢丝,镀锌钢丝
strand wire 绞合线,多股线,绳索
stranded galvanized steel wire 镀锌钢绞线
stranded welding wire 综合焊条，综合焊丝
strap wire 带状电线

streamline wire 流线型张线
subsidiary wire 辅线
substation wire 屋内线
supporting wire 吊线, 支撑线
superconductive wire 超导体(铌锡合金)丝
suspension wire 吊线
switch (control) wire 道岔(控制)导线
tag wire 终端线
tantalum wire 钽丝
teflon insulated wire 聚四氟乙烯绝缘电线
telegraph wire 电报线
telephone call wire 电话挂号线, 电话传号线
thermoeletric wire 热电导线
thermoplastic-covered wire 塑料绝缘电线, 聚氯乙烯绝缘线
tightening wire 拉线
tin plated steel wire 镀锡钢丝
tinned wire 镀锡铜线
titanium wire 钛线, 钛丝
toe bead wire (轮胎的)缘趾线环
top wire 上网
torsion wire 扭力丝
track circuit wire 轨道电路连接线
tracker wire 跟踪线
transit with stadia wires 视距丝式经纬仪
trapezoidal steel wire 梯形钢丝
trolley wire 架空线, 滑接线
tungsten wire 钨丝
twin wire 双股线
twisted wire 绞合线
twister wire 磁扭线
upper wire 上(层)网
varinshed wire 漆包线
vent wire 通气针
voltaic wire 导线
weld wire 铜包钢丝
welding wire 焊条[丝]
winding wire 绕组线
woven wire 铁丝网
zinc-coated wire 镀锌钢丝
mosquito netting 蚊帐
wire netting 导线[铁丝]网
steel wire netting 钢丝网
wire netting 金属丝网

金属废料中英文名称对照

中文名	英文名	品质描述
6063	6063 Extrusion-pntd	镀漆
6061	6061 Extrusion-pntd	镀漆
生铝件	Tense	含铁〈2%
生杂铝	Mixed Cast	含铁〈2%
旧铝片	Old Sheet-Taint/Tabor	干净
新铝片	Tough-Taboo	干净
切碎铝	Shredded Aluminum	干净
汽车切片铝	Shredded Auto Aluminum	含铝 70%
带铁铝	Irony Aluminum	需标明含量
356 轮毂铝	356 Auto Wheels	干净
铝水箱	Aluminum Radiator	干净
带皮铝线	Acsr/Ins	需标明含量
铜铝水箱	Al/Cu Radiator	干净
易拉罐	UBC-Baled/Densified	干净
铝变压器	Aluminum Transformer	
铝壳马达	Aluminum Case Motor	
1#光亮铜线	#1 Bare Bright	干净
1#铜	#1 Candy	含铜 98%
2#铜	#2 Birch/Cliff	含铜 94-96%
1#火烧线	#1 Burnt Wire	含铜〉97%
1#铜米	#1 Cu-chop	
1#铜线缆	#1 Insulated Wire	含铜 72%
2#铜线缆	#2 Insulated Wire	含铜 50-55%
1#2#混合铜线缆	#1#2 Mixed Wire	含铜 65%
黄杂铜	Yellow Brass-Honey	干净
干净铜水箱	Ocean Auto Radiator	干净
(牛粪)切碎电机	Shredded Pickings	含铜 18-20%
混合电机	Electric Motors	含铜 8-12%
304 炉料	304 Sabot	18-8
304 可利用料	304 Reusable	板或杆
316 可利用料	316 Reusable	板或杆

金属材料词汇

GB/T 221-1979 钢铁产品牌号表示方法 Notations for markings of iron and steel products
2 GB/T 341-1989 钢丝分类及术语 Steel wire—Classification and vocabular
3 GB/T 343-1994 一般用途低碳钢丝 Low carbon steel wire for general uses
4 GB/T 346-1984 通讯线用镀锌低碳钢丝 Galvanized low carbon steel wire for electric communications lines
5 GB/T 347-1982 针布钢丝 Card wire
6 GB/T 348-1964 刺钢丝 Barbed steel wires
7 GB/T 352-1988 密封钢丝绳 Locked coil wire ropes
8 GB/T 699-1988 优质碳素结构钢 技术条件 Quality carbon structure steel--Technical requirements
9 GB/T 700-1988 碳素结构钢 Carbon structural steels
10 GB/T 702-1986 热轧圆钢和方钢尺寸、外形、重量及允许偏差 Hot-rolled round and square steels--Dimension,shape, weight and tolerance
11 GB/T 704-1988 热轧扁钢尺寸、外形、重量及允许偏差 Dimensions, shape, weight and tolerances for hot-rolled flats
12 GB/T 705-1989 热轧六角钢和八角钢尺寸、外形、重量及允许偏差 Hot-rolled hexagonal and octagonal steel bars—Dimensions, shape, weight and tolerance
13 GB/T 706-1988 热轧工字钢尺寸、外形、重量及允许偏差 Hot-rolled beam steel—Dimensions, shape, weight and tolerances
14 GB/T 707-1988 热轧槽钢尺寸、外形、重量及允许偏差 Hot-rolled channel steel—Dimensions, shape, weight and tolerances
15 GB/T 708-1988 冷轧钢板和钢带的尺寸、外形、重量及允许偏差 Dimensions, shape, weight and tolerances for cold-rolled plates and sheets
16 GB/T 709-1988 热轧钢板和钢带的尺寸、外形、重量及允许偏差 Dimensions, shape, weight and tolerances for hot-rolled plates and sheets
17 GB/T 710-1991 优质碳素结构钢热轧薄钢板和钢带 Hot-rolled quality carbon structural steel sheets and strips
18 GB/T 711-1988 优质碳素结构钢热轧厚钢板和宽钢带 Hot-rolled quality carbon structural steel plates and wide strips
19 GB 712-1988 船体用结构钢 Hull structural steel
20 GB/T 714-1965 桥梁建筑用热轧碳素钢 技术条件 Technical requirements for hot-rolled carbon steels for bridges
标准件用碳素钢热轧圆钢 Hot-rolled round carbon steel bars for standard parts
22 GB/T 716-1991 碳素结构钢冷轧钢带 Cold-rolled carbon structural steel strips
23 GB/T 718-1982 铸造用生铁 Foundry pig iron
24 GB/T 905-1994 冷拉圆钢、方钢、六角钢尺寸、外形、重量及允许偏差 Dimension, shape, weight and tolerance for cold-drawn round, square and hexagonal steels
25 GB/T 908-1987 锻制圆钢和方钢尺寸、外形、重量及允许偏差 Forged round and square steels--Dimension, shape, weightand tolerance
26 GB/T 911-1966 工具钢热轧及锻制扁钢品种 Hot-rolled and forged tool steel flats
27 GB/T 912-1989 碳素结构钢和低合金结构钢热轧薄钢板及钢带 Hot-rolled plain carbon and low alloy structural steel sheets and strips
28 GB/T 1220-1992 不锈钢棒 Stainless steel bars

29 GB/T 1221-1992 耐热钢棒 Heat-resisting steel bars
30 GB/T 1222-1984 弹簧钢 Spring steel
31 GB/T 1234-1995 高电阻电热合金 High resistance alloys for electrical heating
32 GB/T 1298-1986 碳素工具钢技术条件 Carbon tool steels--Technical requirements
33 GB/T 1299-1985 合金工具钢技术条件 Alloy tool steels--Technical requirements
34 GB/T 1301-1994 凿岩钎杆用中空钢 Rock drilling equipment--Hollow drill steels in bar form
35 GB/T 1412-1985 球墨铸铁用生铁 Pig iron used for spheroidal graphite cast iron
36 GB/T 1591-1994 低合金高强度结构钢 High strength low alloy structural steels
37 GB/T 2101-1989 型钢验收、包装、标志及质量证明书的一般规定 General requirements of acceptance, packaging, marking and certification for section steel
38 GB/T 2102-1988 钢管的验收、包装、标志和质量证明书 Acceptance, packing, marking, and certification of pipe
39 GB/T 2103-1988 钢丝验收、包装、标志及质量证明书的一般规定 General provisions for checking, packing, marking and quality certification of steel wire
40 GB/T 2104-1988 钢丝绳包装、标志及质量证明书的一般规定 Steel wire ropes--Packing, marking and certificate--General requirements
41 GB/T 2272-1987 硅铁 Ferrosilicon
42 GB/T 2517-1981 一般结构用热连轧钢板和钢带 Continuously hot rolled steel sheets and strips for common structures
43 GB/T 2518-1988 连续热镀锌薄钢板和钢带 Continual hot-dip zinc-coated steel sheets and strips
44 GB/T 2519-1981 热连轧钢板和钢带品种 Varieties of continuously hot rolled steel sheets and strips
45 GB/T 2520-1988 电镀锡薄钢板和钢带 Tin electroplated steel sheets and strips
46 GB/T 2521-1996 冷轧晶粒取向、无取向磁性钢带(片) Cold-rolled grain-oriented and non-oriented magnetic steel strip(sheet)
47 GB 2585-1981 铁路用每米 38~50 公斤钢轨技术条件 Technical requirements for 38kg/m to 50kg/m steel rails for railway
48 GB/T 2597-1994 窗框用热轧型钢 Heat-rolled window sash steel
49 GB/T 2774-1991 金属锰 Manganese metal
50 GB/T 2826-1981 每米 38~50 公斤钢轨用垫板 技术条件 Tie-plates--Technical requirements for 38kg/m to 50 kg/m steel rails
51 GB/T 3077-1988 合金结构钢技术条件 Alloy structure steel--Technical requirements
52 GB/T 3078-1994 优质结构钢冷拉钢材技术条件 Technical requirements for quality structural steel cold drawn bars
53 GB/T 3079-1993 合金结构钢丝 Alloy structure steel wires
54 GB/T 3080-1982 高速工具钢丝 High speed tool steel wire
55 GB/T 3082-1984 铠装电缆用镀锌低碳钢丝 Galvanized low carbon steel wire for armouring cables
56 GB/T 3086-1982 高碳铬不锈轴承钢技术条件 Specification for high carbon chromium stainless bearing steels
57 GB 3087-1982 低中压锅炉用无缝钢管 Seamless steel tubes for low and medium pressure boiler

58 GB/T 3089-1982 不锈耐酸钢极薄壁无缝钢管 Thinnest-wall seamless tubes of stainless and acid-resistance steel
59 GB/T 3090-1982 不锈钢小直径钢管 Slainless steel small diameter steel tubes
60 GB/T 3091-1993 低压流体输送用镀锌焊接钢管 Galvanized welded steel pipe for low pressure service
61 GB/T 3092-1993 低压流体输送用焊接钢管 Welded steel pipe for low pressure service
62 GB/T 3094-1982 冷拔无缝异型钢管 Cold drawn seamless special-shape steel pipe
63 GB/T 3203-1982 渗碳轴承钢技术条件 Specification for carburizing steels of bearings
64 GB/T 3206-1982 优质碳素结构钢丝 Carbon constructional quality steel wires
65 GB/T 3207-1988 银亮钢 Bright steel
66 GB/T 3211-1987 金属铬 Chromium metal
67 GB/T 3273-1989 汽车大梁用热轧钢板 Hot-rolled steel plates and sheets for automobile frames
68 GB/T 3274-1988 碳素结构钢和低合金结构钢 热轧厚钢板和钢带 Carbon structural and low alloy steel--Rotled plates and strips
69 GB/T 3275-1991 汽车制造用优质碳素结构钢热轧钢板和钢带 Hot-rolled quality carbon structural steel plates and strips for automobile
70 GB/T 3277-1991 花纹钢板 Corrugated steel plates with lath and lentilform
71 GB/T 3278-1982 碳素工具钢热轧钢板技术条件 Technical requirements for hot-rolled carbon tool steel sheets and plates
72 GB/T 3279-1989 弹簧钢热轧薄钢板 Hot-rolled spring steel sheets
73 GB/T 3280-1992 不锈钢冷轧钢板 Cold rolled stainless steel sheets and plates
74 GB/T 3282-1987 钛铁 Ferrotitanium
75 GB/T 3414-1994 煤机用热轧异型钢 Hot-rolled profiled steels for coal mechanism
76 GB/T 3418-1982 电解金属锰 Electrolytic manganese metal
77 GB/T 3420-1982 灰口铸铁管件 Gray iron castigs for pipe fittings
78 GB/T 3421-1982 砂型离心铸铁管 Cast-iron pressure pipe centrifugally cast in sand-lined molds
79 GB/T 3422-1982 连续铸铁管 Cast-iron pressure pipe made by continuous casting process
80 GB 3423-1982 金刚石岩心钻探用无缝钢管 Seamless steel tubes standard use diamond core dvilling
81 GB/T 3429-1994 焊接用钢盘条 Wire rods for electrode
82 GB/T 3522-1983 优质碳素结构钢冷轧钢带 Cold-rolled quality carbon structural steel strips
83 GB/T 3524-1992 碳素结构钢和低合金结构钢热轧钢带 Hot-rolled cardon and low alloy structural steel strips
84 GB 3531-1996 低温压力容器用低合金钢钢板 Low alloy steel plates for low temperature pressure vessels
85 GB/T 3639-1983 冷拔或冷轧精密无缝钢管 Cold-drawn or rolled precision seamless steel tubes
86 GB/T 3640-1988 普通碳素钢电线套管 Plain carbon steel pipes for electric wire
87 GB/T 3641-1983 P3 型镀锌金属软管 Type p3 galvanized metallic flexible hose
88 GB/T 3642-1983 S 型钎焊不锈钢金属软管 Type S brazed stainless steel flexible metallic hose
89 GB/T 3648-1996 钨铁 Ferrotungsten

90 GB/T 3649-1987 钼铁 Ferromolybdenum
91 GB/T 3650-1995 铁合金验收、包装、储运、标志和质量证明书的一般规定 The general rules for inspection, packing, storing transportation, marking and certification of ferroalloy
92 GB/T 3795-1996 锰铁 Ferromanganese
93 GB/T 4008-1996 锰硅合金 Ferromanganese-silicon
94 GB/T 4009-1989 硅铬合金 Chromium silicon
95 GB/T 4010-1994 铁合金化学分析用试样的采取和制备 Ferroalloys--Sampling and preparation of samples for chemical analysis
96 GB/T 4137-1993 稀土硅铁合金 Rare-earth ferrosilicon
97 GB/T 4138-1993 稀土镁硅铁合金 Rare-earth ferrosilicomagnesium
98 GB/T 4139-1987 钒铁 Ferrovanadium
99 GB/T 4223-1996 废钢铁 Iron and steel scraps
100 GB/T 4226-1984 不锈钢冷加工钢棒 Cold finished stainless steel bars
101 GB/T 4227-1984 不锈钢热轧等边角钢 Hot rolled stainless steel with equal leg angles
102 GB/T 4229-1984 不锈钢板重量计算方法 Methods of weight calculation of stainless steel plates and sheets
103 GB/T 4231-1993 弹簧用不锈钢冷轧钢带 Cold rolled stainless steel strips for springs
104 GB/T 4232-1993 冷顶锻用不锈钢丝 Stainless steel wires for cold heading and cold forging
105 GB 4234-1994 外科植入物用不锈钢 Stainless steel for surgical implants
106 GB/T 4237-1992 不锈钢热轧钢板 Hot rolled stainless steel sheets and plates
107 GB/T 4238-1992 耐热钢板 Heat-resisting steel sheets and plates
108 GB/T 4239-1991 不锈钢和耐热钢冷轧钢带 Cold rolled stainless steel and heatresisting steel strips
109 GB/T 4240-1993 不锈钢丝 Stainless steel wires
110 GB/T 4241-1984 焊接用不锈钢盘条 Stainless steel wire rods for welding
111 GB/T 4354-1994 优质碳素钢热轧盘条 Hot-rolled quality carbon steel wire rods
112 GB/T 4356-1984 不锈钢盘条 Stainless steel wire rods
113 GB/T 4357-1989 碳素弹簧钢丝 Carbon spring steel wires
114 GB/T 4358-1995 重要用途碳素弹簧钢丝 Carbon spring steel wire for significant use
115 GB/T 4461-1992 热双金属带材 Thermostatic bimetal strips
116 GB 4463-1984 预应力混凝土用热处理钢筋 Heat-treated steel bar for prestressed concrete
117 GB/T 4697-1991 矿山巷道支护用热轧 U 型钢 Hot-rolled U-type steel for mine timbering
118 GB 5068-1985 铁路机车、车辆用车轴钢坯 Axles blooms for railway locomotive and wagons
119 GB/T 5213-1985 深冲压用冷轧薄钢板和钢带 Cold rolled sheets and strips for deep drawing
120 GB/T 5216-1985 保证淬透性结构钢技术条件 Technical requirements for structural steel with specified hardenability bands
121 GB/T 5218-1985 硅锰弹簧钢丝 Silicon-manganese spring steel wire
122 GB/T 5219-1985 铬钒弹簧钢丝 Chromium-vanadiam spring steel wire
123 GB/T 5221-1985 铬硅弹簧钢丝 Chromium-silicon spring steel wire
124 GB/T 5222-1985 弹簧垫圈用梯形钢丝 Trapezed steel wire for spring washer
125 GB/T 5223-1995 预应力混凝土用钢丝 Steel wires for prestressed concrete

126 GB/T 5224-1995 预应力混凝土用钢铰线 Steel strand for prestressed concrete
127 GB 5310-1995 高压锅炉用无缝钢管 Seamless steel tubes and pipes for high pressure boiler
128 GB/T 5312-1985 船舶用碳钢无缝钢管 Carbon steel seamless steel tubes for ship
129 GB/T 5313-1985 厚度方向性能钢板 Steel plate with through-thickness characteristics
130 GB/T 5612-1985 铸铁牌号表示方法 Code for representing cast iron
131 GB/T 5682-1995 硼铁 Ferroboron
132 GB/T 5683-1987 铬铁 Ferrochromium
133 GB/T 5684-1987 真空法微碳铬铁 Vacuum extra low carbon ferrochromium
134 GB/T 5952-1986 碳素工具钢丝 Carbon tool steel wires
135 GB/T 5953-1986 冷顶锻用碳素结构钢丝 Carbon structure steel wires for cold heading
136 GB/T 5954-1986 冷顶锻用合金结构钢丝 Alloy structure steel wires for cold heading
137 GB/T 6145-1985 锰铜、康铜精密电阻合金 Manganin and constantan precision resistance alloys
138 GB/T 6149-1985 新康铜电阻合金 New constantan resistance alloy
139 GB/T 6478-1986 冷镦钢技术条件 Cold heading steel--Technical requirements
140 GB 6479-1986 化肥设备用高压无缝钢管 High-pressure seamless steel tubes for chemical fertilizer equipments
141 GB/T 6480-1994 凿岩用硬质合金钎头 Carbide detachable bit for rock drilling
142 GB/T 6481-1994 凿岩用锥形连接中空六角形钎杆 Hollow hexagonal drill rods with tapered connection for rock drilling
143 GB/T 6482-1994 凿岩用波形螺纹连接钎杆 Rope thread extension steel bars for rock drilling
144 GB/T 6483-1986 柔性机械接口灰口铸铁管 Soft mechanical joint grey cast iron pipe
145 GB 6653-1994 焊接气瓶用钢板 Steel plates for welded gas cylinders
146 GB 6654-1996 压力容器用钢板 Steel plates for pressure vessels
147 GB/T 6723-1986 通用冷弯开口型钢尺寸、外形、重量及允许偏差 Cold forming sectional steel--Open sectional steel for general structure--Demension, form, weight and permissible deviations
148 GB/T 6724-1986 冷弯波形钢板 Cold forming corrugated sheet
149 GB/T 6725-1992 冷弯型钢技术条件 Technical requirements of cold forming sectional steel
150 GB/T 6726-1986 货运汽车用冷弯型钢尺寸、外形、重量及允许偏差 Cold forming sectional steel for cargo vehicle--Demension, form, weight and permissible deviations
151 GB/T 6727-1986 客运汽车用冷弯型钢尺寸、外形、重量及允许偏差 Cold forming sectional steel for passenger vehicle--Demension, form, weight and permissible deviations
152 GB/T 6728-1986 结构用冷弯空心型钢尺寸、外形、重量及允许偏差 Cold forming sectional steel--Hollow sectional steel for general structure--Demension, form, weight and permissible deviations
153 GB/T 6883-1995 线、棒和管拉模用硬质合金模坯 Wire、bar or tube drawing dies--As sintered pellets of hardmetal
154 GB/T 6983-1986 电磁纯铁棒材技术条件 Technical requirements for magnetic iron bars
155 GB/T 6984-1986 电磁纯铁热轧厚板技术条件 Technical requirements for magnetic iron hot-rolled plates
156 GB/T 6985-1986 电磁纯铁冷轧薄板 Magnetic iron cold-rolled sheets
157 GB/T 7738-1987 铁合金产品牌号表示方法 Notations for designation of ferroalloys

158 GB/T 8162-1987 结构用无逢纲管 Seamless steel pipes for structural purposes
159 GB/T 8163-1987 输送流体用无缝钢管 Seamless steel pipes for liquid service
160 GB/T 8164-1993 焊接钢管用钢带 Steel strips for welded steel pipe
161 GB 8601-1988 铁路用辗钢整体车轮 Rolled solid wheels for railway
162 GB 8602-1988 铁路用粗制轮箍 Rough-rolled tyres for railway
163 GB/T 8649-1988 轧制钢球 Rolling balls
164 GB/T 8706-1988 钢丝绳术语 Steel wire ropes--Terminology
165 GB/T 8713-1988 液压和气动缸筒用精密内径无缝钢管 Inside diameter required precision seamless steel tube for hydraulic and pneumatic cylinder use
166 GB/T 8714-1988 梯唇型橡胶圈接口铸铁管 Grey cast iron pipes with rubber ring of ladder-lip-shaped
167 GB/T 8715-1988 柔性机械接口铸铁管件 Soft mechanical joint grey cast iron fittings
168 GB/T 8731-1988 易切削结构钢 技术条件 Free-cutting steel--Technical requirements
169 GB/T 8732-1988 汽轮机叶片用钢 Steels for vane of steam turbine
170 GB/T 8749-1988 优质碳素结构钢热轧钢带 Hot-rolled quality carbon structural steel strips
171 GB 8903-1988 电梯用钢丝绳 Steel wire ropes for elevators
172 GB/T 8918-1996 钢丝绳 Steel wire ropes
173 GB/T 8919-1996 制绳用钢丝 Wire for steel wire ropes use
174 GB/T 9787-1988 热轧等边角钢 尺寸、外形、重量及允许偏差 Hot-rolled equal--leg angle steel--Dimensions, shape, weight and tolerances
175 GB/T 9788-1988 热轧不等边角钢 尺寸、外形、重量及允许偏差 Hot-rolled unequal--leg angle steel--Dimensions, shape, weight and tolerances
176 GB/T 9941-1988 高速工具钢钢板技术条件 High speed tool steel sheets and plates--Technical requirements
177 GB/T 9942-1988 高速工具钢大截面锻制钢材技术条件 High speed tool steel forged bars with large section--Technical requirements
178 GB/T 9943-1988 高速工具钢棒技术条件 High speed tool steel bars--Technical requirements
179 GB/T 9944-1988 不锈钢丝绳 Stainless steel wire ropes
180 GB/T 9945-1988 造船用球扁钢 Bulb flat steel for shipbuilding
181 GB/T 9946-1988 热轧 L 型钢尺寸、外形、重量及允许偏差 Dimensions, shape, weight and tolerances for hot-rolled L-sectional steel
182 GB 9948-1988 石油裂化用无缝钢管 Seamless steel tubes for petroleum cracking
183 GB/T 9971-1988 原料纯铁 Pure iron for raw material
184 GB/T 10131-1988 铌锰铁合金 Mn-Nb-Fe alloy
185 GB/T 10560-1989 矿用高强度圆环链用钢技术条件 High tensile steels for round link chains for mines—Technical requirements
186 GB/T 11181-1989 子午线轮胎用钢丝帘线 Steel cord for radial tyre
187 GB/T 11182-1989 橡胶软管增强用钢丝 Steel wire for hose reinfocement
188 GB/T 11251-1989 合金结构钢热轧厚钢板 Hot-rolled alloy structural steel plates
189 GB/T 11252-1989 犁壁用热轧三层钢板和宽钢带 Hot-rolled tri-clad plates and wide strips for plough wall
190 GB/T 11253-1989 碳素结构钢和低合金结构钢冷轧薄钢板及钢带 Cold-rolled plain carbon and low alloy structural steel sheets and strips

191 GB/T 11254-1989 压缩机阀片用热轧薄钢板 Hot rolled steel sheets for compressor valves
192 GB/T 11256-1989 粗直径钢丝绳 Large diameter steel wire ropes
193 GB/T 11264-1989 轻轨 Light rails
194 GB/T 11265-1989 轻轨用接头夹板 Fish plates for light rails
195 GB/T 11266-1989 轻轨用垫板 Tie plates for light rails
196 GB/T 12753-1991 输送带用钢丝绳 Steel wire ropes for conveyer belts
197 GB/T 12754-1991 彩色涂层钢板及钢带 Coloured paint coat steel plates and strips
198 GB/T 12755-1991 建筑用压型钢板 Roll-profiled steel sheet for building
199 GB/T 12756-1991 胶管用钢丝绳 Steel wire ropes for rubber hose
200 GB/T 12770-1991 机械结构用不锈钢焊接钢管 Welded stainless steel tubes for machine structure
201 GB/T 12771-1991 流体输送用不锈钢焊接钢管 Welded stainless steel pipes for liquid delivery
202 GB/T 12772-1991 排水用柔性接口铸铁管及管件 Cast iron pipes and fittings with flexible joint for semerage
203 GB/T 12773-1991 内燃机气阀钢钢棒技术条件 Valve steel bars for internal combustion engines—Technical requirements
204 GB 13013-1991 钢筋混凝土用热轧光圆钢筋 Hot rolled plain steel bars for the reinforcement of concrete
205 GB 13014-1991 钢筋混凝土用余热处理钢筋 Remained heat treatment ribbed steel bars for the reinforcement of concrete
206 GB/T 13237-1991 优质碳素结构钢冷轧薄钢板和钢带 Cold-rolled quality carbon structural steel sheets and strips
207 GB/T 13238-1991 铜钢复合钢板 Copper-steel clad plates
208 GB/T 13294-1991 球墨铸铁管件 Ductile iron pipe fittings
209 GB/T 13295-1991 离心铸造球墨铸铁管 Centrifugal casting ductile iron pipe
210 GB 13296-1991 锅炉、热交换器用不锈钢无缝钢管 Seamless stainless steel tubes for boiler and heat exchanger
211 GB/T 13297-1991 精密合金包装、标志和质量证明书的一般规定 General rules for packaging, marking and certification of precision alloys
212 GB/T 13304-1991 钢分类 Steels—Classification
213 GB 13447-1992 无缝气瓶用钢坯 Steel blank for seamless gas cylinder
214 GB 13788-1992 冷轧带肋钢筋 Cold rolling ribbed steel wires and bars
215 GB/T 13790-1992 日用搪瓷用冷轧薄钢板和钢带 Cold rolled sheets and strips for civil enameling
216 GB/T 13791-1992 冷拉异型钢 Cold drawn special shaped steel bar
217 GB/T 13792-1992 带式输送机托辊用电焊钢管 Welded steel pipe for supporting roller of belt conveyer
218 GB/T 13793-1992 直缝电焊钢管 Longitudinal electric resistance welded steel tubes
219 GB/T 13795-1992 工业链条用冷轧钢带 cold-rolled steel strips for industial chain
220 GB/T 13796-1992 工业链条用冷拉钢 Cold-drawn steels for industrial chain
221 GB/T 14164-1993 石油天然气输送管用热轧宽钢带 Hot-rolled wide strips for line pipe of oil and natural gas
222 GB/T 14291-1993 矿用流体输送电焊钢管 Welded steel pipe for mine liquid service

223 GB/T 14292-1993 碳素结构钢和低合金结构钢热轧条钢技术条件 Hot-rolled long products technical requirements for carbon structure steel and low-alloy structure steel
224 GB 14450-1993 胎圈用钢丝 Bead wire
225 GB/T 14451-1993 操纵用钢丝绳 Steel wire ropes for control
226 GB/T 14957-1994 熔化焊用钢丝 Steel wires for melt welding
227 GB/T 14958-1994 气体保护焊用钢丝 Steel wires for gas shielded welding
228 GB/T 14975-1994 结构用不锈钢无缝钢管 Stainless steel seamless tubes for structures
229 GB/T 14976-1994 流体输送用不锈钢无缝钢管 Stainless steel seamless pipes for fluid transport
230 GB/T 14977-1994 热轧钢板表面质量的一般要求 General requirement of surface finish for hot rolled steel plates
231 GB/T 14978-1994 连续热浸镀铝锌硅合金镀层钢带和钢板 Continual hot-dip aluminium zinc silicon alloy coated steel strips and sheets
232 GB/T 14980-1994 低压流体输送用大直径电焊钢管 Major diameter welded steel pipe for lowpressure liquid service
233 GB/T 14981-1994 热轧盘条尺寸、外形、重量及允许偏差 Dimenisions shape weight and tolerances for hot-rolled wire rods
234 GB/T 14984-1994 铁合金术语 Ferroalloys--Vocabulary
235 GB/T 14985-1994 膨胀合金的尺寸、外形、表面质量、试验方法和检验规则的一般规定
236 GB/T 14986-1994 耐蚀软磁合金技术条件
237 GB/T 14987-1994 高硬度高电阻高磁导合金 High permability alloys with high hardness and high electrical resistance
238 GB/T 14988-1994 磁滞合金冷轧带 Cold-rolled strips for hysteresis alloys
239 GB/T 14989-1994 铁钴钒永磁合金 Iron-cobalt-vanadium permanent-magnet alloys
240 GB/T 14990-1994 铁钴钼磁滞合金热轧(或锻)棒材 Hot rolled (or forged) bars for iron-cobalt-molybdenum hysteresis alloys
241 GB/T 14991-1994 变形永磁钢 Deformable permanent-magnet steels
242 GB/T 14992-1994 高温合金牌号 Types of heat-resisting superalloys
243 GB/T 14993-1994 转动部件用高温合金热轧棒材 Hot-rolled heat-resisting superalloy bars for rotating parts
244 GB/T 14994-1994 高温合金冷拉棒材 Cold brawn heat-resisting superalloy bars
245 GB/T 14995-1994 高温合金热轧钢板 Hot-rolled heat-resisting superalloy plates
246 GB/T 14996-1994 高温合金冷轧薄板 Cold-Rolled heat-Resisting superalloy sheets
247 GB/T 14997-1994 高温合金锻制圆饼 Forged heat-resisting superalloy disks
248 GB/T 14998-1994 高温合金环件毛坯 Heat-resisting superalloy blanks for forged rings
249 GB/T 14999.1-1994 高温合金棒材纵向低倍组织酸浸试验法 Methods of acid etch test for longitudinal macro-structures of heat-resisting superalloy bars
250 GB/T 14999.2-1994 高温合金横向低倍组织酸浸试验法 Methods of acid etch test for transvese macro-structures of heat-resisting superalloys
251 GB/T 14999.3-1994 高温合金棒材纵向断口试验法 Methods of longitudinal fracture test for heat-resisting superalloy bars
252 GB/T 14999.4-1994 高温合金显微组织试验法 Methods of examining micro-structures for heat-resisting superalloys
253 GB/T 14999.5-1994 高温合金低倍、高倍组织标准评级图谱 Photomicrographs and

photomacrographs for evaluating of heat-resisting superalloys
254 GB/T 15001-1994 软磁合金尺寸、外形、表面质量、试验方法和检验规则的一般规定
255 GB/T 15002-1994 高饱和磁感应强度软磁合金技术条件
256 GB/T 15003-1994 恒磁导率合金技术条件
257 GB/T 15004-1994 铁铝软磁合金技术条件
258 GB/T 15005-1994 磁温度补偿合金技术条件
259 GB/T 15006-1994 弹性合金的尺寸、外形、表面质量、试验方法和检验规则的一般规定
260 GB/T 15007-1994 耐蚀合金牌号
261 GB/T 15008-1994 耐蚀合金棒
262 GB/T 15009-1994 耐蚀合金热轧板
263 GB/T 15010-1994 耐蚀合金冷轧薄板
264 GB/T 15011-1994 耐蚀合金冷轧(拔)无缝管
265 GB/T 15012-1994 耐蚀合金冷轧带
266 GB/T 15013-1994 精密合金用磁学特性和磁学量术语
267 GB/T 15014-1994 弹性合金领域内的物理特性和物理量术语与定义
268 GB/T 15015-1994 膨胀合金领域内的物理特性和物理量术语与定义
269 GB/T 15016-1994 热双金属领域内的物理特性和物理量术语与定义
270 GB/T 15017-1994 电阻合金领域内的物理特性和物理量术语与定义
271 GB/T 15018-1994 精密合金牌号
272 GB/T 15019-1994 快淬金属的分类和牌号
273 GB/T 15062-1994 一般用途高温合金管 Heat--resisting superalloy tube for general application
274 GB/T 15391-1994 宽度小于 600mm 冷轧钢带的尺寸、外形及允许偏差 Dimensions,shape and tolerances for cold-rolled steel strips with a width lessthan 600mm
275 GB/T 15392-1994 宽度小于 700mm 连续热镀锌钢带 Continual hot-dip zinc-coated steel strips with a width less than 700mm
276 GB/T 15393-1994 钢丝镀锌层 Zinc coatings for steel wire
277 GB/T 15574-1995 钢产品分类 Steel products classification and definitions
278 GB/T 15575-1995 钢产品标记代号 Steel products standard designation
279 GB/T 15675-1995 连续电镀锌冷轧钢板及钢带 Continuously electrolytic zinc-coated cold-rolled steel sheets and strips
280 GB/T 15710-1995 硅钡合金 Silicon barium alloy
281 GB/T 15712-1995 非调质机械结构钢 Ferritic--Pearlitic engineering steels for precipitation hardening from hot--Working temperature
282 GB/T 16269-1996 面接触钢丝绳 Facial contacted wire ropes
283 GB/T 16270-1996 高强度结构钢热处理和控轧钢板、钢带 High-strength structural steel plates and strips: products supplied in the heat-treated or controlled rolled condition
284 GB/T 16271-1996 钢丝绳吊索--插编索扣 Steel wire ropes--Spliced eye termination for slings
285 GB/T 342-1997 冷拉圆钢丝、方钢丝、六角钢丝尺寸、外形、重量及允许偏差 Dimension shape mass and tolerance for cold-drawn round square and hexagonal steel wires
286 GB/T 701-1997 低碳钢热轧圆盘条 Hot-rolled low carbon steel wire rods
287 GB/T 16761-1997 锻制扁钢尺寸、外形、重量及允许偏差 Dimensions,shape,weight and tolerances for forged flats

288 GB/T 16762-1997 一般用途钢绳吊索特性和技术条件 Wire rope slings for general purposes--Characteristics and specifications
289 GB/T 181-1963 每米 50 公斤钢轨型式尺寸 50 kg/m Steel rails
290 GB/T 182-1963 每米 43 公斤钢轨型式尺寸 43 kg/m steel rails
291 GB/T 183-1963 每米 38 公斤钢轨型式尺寸 38 kg/m steel rails
292 GB/T 184-1963 每米 50 公斤钢轨用鱼尾板式尺寸 Fish-plates for 50 kg/m steel rails
293 GB/T 185-1963 每米 38 及 43 公斤钢轨用鱼尾板型式尺寸 Fish-plates for 43 kg/m and 38 kg/m steel rails
294 GB/T 186-1963 每米 50 公斤钢轨用垫板型式尺寸 Tie-plates for 50 kg/m steel rails
295 GB 713-1997 锅炉用钢板 Steel plates for boilers
296 GB 17100-1997 外科植入物用铸造钴铬钼合金 Casting Co-Cr-Mo alloy for surgical implants
297 GB/T 247-1997 钢板和钢带检验、包装、标志及质量证明书的一般规定 General rule of acceptance,package,mark and certification for steel plates(sheets) and strips
298 GB/T 3428-1997 钢芯铝绞线用镀锌钢丝 Galvanized steel core wires for aluminium cable steel reinforced
299 GB/T 7737-1997 铌铁 Ferroniobium
300 GB/T 8165-1997 不锈钢复合钢板和钢带 Stainless steel clab plates and strips
301 GB/T 17101-1997 桥梁缆索用热镀锌钢丝 Hot-dip galvanized steel wires for bridge cables
302 GB/T 17102-1997 不锈复合钢冷轧薄钢板和钢带 Cold rolled stainless steel clad sheets and strips
303 GB/T 17107-1997 锻件用结构钢牌号和力学性能 Structural steel grades and mechanical property for forgings
304 GB/T 17395-1998 无缝钢管尺寸、外形、重量及允许偏差 Dimensions、shapes、masses and tolerances of seamless steel tubes
305 GB/T 17396-1998 液压支柱用热轧无缝钢管 Seamless hot--Rolled steel tubes for hydraulic pillar service
306 GB/T 11263-1998 热轧 H 型钢和剖分 T 型钢 The hot-rolled H and cut T section steel
307 GB/T 17456-1998 球墨铸铁管 外表面喷锌涂层 Ductile iron pipes--External zinc-spray coating
308 GB/T 17457-1998 球墨铸铁管 水泥砂浆离心法衬层 一般要求 Ductile iron pipes--Centrifugal cement mortar lining--General requirements
309 GB/T 17458-1998 球墨铸铁管 水泥砂浆离心法衬层 新拌砂浆的成份检验 Ductile iron pipes--Centrifugal cement mortar lining--Composition controls of freshly applied mortar
310 GB/T 17459-1998 球墨铸铁管 沥青涂层 Ductile iron pipes--Bitumen coating
311 GB/T 17505-1998 钢及钢产品交货一般技术要求 Steel and steel products General technical delivery requirements
312 GB 1499-1998 钢筋混凝土用热轧带肋钢筋 Hot rolled ribbed steel bars for the reinforcement of concrete
313 GB/T 717-1998 炼钢用生铁 Pig iron for steelmaking
314 GB/T 17616-1998 钢铁及合金牌号统一数字代号体系 Unified numbering system for designations of iron,steel and alloy

Metal Terminology

ACCORDION REED STEEL

Hardened, tempered, polished and blued or yellow flat steel with dressed edges. Carbon content about 1.00%. Material has to possess good flatness, uniform hardness and high elasticity.

ACID-BRITTLENESS

Brittleness resulting from pickling steel in acid; hydrogen, formed by the interaction between iron and acid, is partially absorbed by the metal, causing acid brittleness.

ACID-PROCESS

A process of making steel, either Bessemer, open-hearth or electric, in which the furnace is lined with a siliceous refractory and for which low phosphorous pig iron is required as this element is not removed.

ACID-STEEL

The term has no reference to the acidity of the steel. (See Acid Process.)

AGE HARDENING

The term as applied to soft or low carbon steels, relates to slow, gradual changes that take place in properties of steels after the final treatment. These changes, which bring about a condition of increased hardness, elastic limit, and tensile strength with a consequent loss in ductility, occur during the period in which the steel is at normal temperatures.

AGING

Spontaneous change in the physical properties of some metals, which occurs on standing, at atmospheric temperatures after final cold working or after a final heat treatment. Frequently synonymous with the term "Age-Hardening."

AIR COOLING

Cooling of the heated metal, intermediate in rapidity between slow furnace cooling and quenching, in which the metal is permitted to stand in the open air.

AIR HARDENING STEEL

Alloy steel which may be hardened by cooling in air from a temperature above the transformation range. Such steels attain their martensitic structure without going through the quenching process. Additions of chromium, nickel, molybdenum and manganese are effective toward this end.

AISI STEELS

Steels of the American Iron and Steel Institute. Common and alloy steels have been numbered in a system essentially the same as the SAE. The AISI system is more elaborate than the SAE in that all numbers are preceded by letters: "A" represents basic open-hearth alloy steel, "B" acid Bessemer carbon steel, "C" basic open-hearth carbon steel, "CB" either acid Bessemer or basic open-hearth carbon steel, "E" electric furnace alloy steel.

ALCLAD

The common name for a type of clad wrought aluminum products, such as sheet and wire, with coatings of high-purity aluminum or an aluminum alloy different from the core alloy in composition. The coatings are anodic to the core so they protect exposed areas on the core electrolytically during exposure to corrosive environments.

ALLOTROPY

(See Polymorphism)

ALLOY

(Met.) Metal prepared by adding other metals or non-metals to a basic metal to secure desirable

properties.

ALLOY STEEL

Steel containing substantial quantities of elements other than carbon and the commonly-accepted limited amounts of manganese, sulfur, silicon, and phosphorous. Addition of such alloying elements is usually for the purpose of increased hardness, strength or chemical resistance. The metals most commonly used for forming alloy steels are: nickel, chromium, silicon, manganese, tungsten, molybdenum and vanadium. “Low Alloy” steels are usually considered to be those containing a total of less than 5% of such added constituents.

ALPHA BRASS

A copper-zinc alloy containing up to 38% of zinc. Used mainly for cold working.

ALPHA BRONZE

A copper-tin alloy consisting of the alpha solid solution of tin in copper. Commercial forms contain 4 or 5% of tin. This alloy is used in coinage, springs, turbine, blades, etc.

ALPHA IRON

The polymorphic form of iron, stable below 1670 癒. has a body centered cubic lattice, and is magnetic up to 1410?F.

ALUMINUM

(Chemical symbol Al) Element No. 13 of the periodic system;. Atomic weight 26.97; silvery white metal of valence 3; melting point 1220 癒.; boiling point approximately 4118 癒.; ductile and malleable; stable against normal atmospheric corrosion, but attacked by both acids and alkalis. Aluminum is used extensively in articles requiring lightness, corrosion resistance, electrical conductivity, etc. Its principal functions as an alloy in steel making are; (1) Deoxidizes efficiently (See Aluminum Killed Steel) (2) Restricts grain growth (by forming dispersed oxides or nitrides) (3) Alloying element in nitriding steel.

ALUMINUM KILLED STEEL

A steel where aluminum has been used as a deoxidizing agent. (See Killed Steel.)

AMORPHOUS

Non-crystalline.

ANNEALING

A heating and cooling operation implying usually a relatively slow cooling. Annealing is a comprehensive term. The process of such a heat treatment may be: to remove stresses; to induce softness; to alter ductility; toughness; electrical magnetic, or other physical properties; to refine the crystalline structure; to remove gases; to produce a definite micro-structure. In annealing, the temperature of the operation and the rate of cooling depend upon the material being heat treated and the purpose of the treatment.

ANODIZING (Aluminum Anodic Oxide Coating)

A process of coating aluminum by anodic treatment resulting in a thin film of aluminum oxide of extreme hardness. A wide variety of dye colored coatings are possible by impregnation in process.

ARTIFICIAL AGING

An aging treatment above room temperature. (See Precipitation Heat Treatment and compare with Natural Aging)

A.S.T.M.

Abbreviation for American Society for Testing Material. An organization for issuing standard specifications on materials, including metals and alloys.

AUSTEMPERING

A trade name for a patented heat treating process that consists of quenching a ferrous alloy from temperature above the transformation ranges, in a medium having a rate of heat abstraction sufficiently high to prevent the formation of high-temperature transformation products and in maintaining the alloy, until transformation is complete, at a temperature below that of pearlite formations and above that of martensite formation.

AUSTENITE

Phase in certain steels, characterized as a solid solution, usually off carbon or iron carbide, in the gamma form of iron. Such steels are known as "austenitic". AUSTENITIC STEEL

Steel which, because of the presence of alloying elements, such as manganese, nickel, chromium, etc., shows stability of Austenite at normal temperatures.

BAINITE

A slender, needle-like (acicular) microstructure appearing in spring steel strip characterized by toughness and greater ductility than tempered Martensite. Bainite is a decomposition product of Austenite best developed at interrupted holding temperatures below those forming fine pearlite and above those giving Martensite.

BANDED STRUCTURE

Appearance of a metal, under a microscope or viewed by the naked eye, on fractured or smoothed surfaces, with or without etching, showing parallel bands in the direction of rolling or working.

BAND SAW STEEL (WOOD)

A hardened tempered bright polished high carbon cold rolled spring steel strip produced especially for use in the manufacture of band saws for sawing wood, non ferrous metals, and plastics. Usually carries some nickel and with a Rockwell value of approximately C40/45.

BARK

Surface of metal, under the oxide-scale layer, resulting from heating in an oxidizing environment. In the case of steel, such bark always suffers from decarburization.

BASE BOX

(See Tin Plate Base Box)

BASIC OPEN HEARTH

(See Open Hearth Process)

BASIC OXYGEN PROCESS

A steel making process wherein oxygen of the highest purity is blown onto the surface of a bath of molten iron contained in a basic lined and ladle shaped vessel. The melting cycle duration is extremely short with quality comparable to Open Hearth Steel.

BASIC PROCESS

A steel making process either Bessemer, open hearth or electric, in which the furnace is lined with a basic refractory. A slag, rich in lime, being formed and phosphorous removed.

BASIC STEEL

(See Basic Process)

BATH ANNEALING

Immersion in a liquid bath (such as molten lead or fused salts) held at an assigned temperature. When a lead bath is used, the process is known as lead annealing.

BAUXITE

The only commercial ore of aluminum, corresponding essentially to the formula Al2O3xH2O.

BEADING

Raising a ridge on sheet metal.

BEND TEST

Various tests used to determine the toughness and ductility of flat rolled metal sheet, strip or plate, in which the material is bent around its axis or around an outside radius. A complete test might specify such a bend to be both with and against the direction of grain. For testing, samples should be edge filed to remove burrs and any edgewise cracks resulting from slitting or shearing. If a vice is to be used then line the jaws with some soft metal or brass so as to permit a free flow of the metal in the sample being tested.

BERYLLIUM COPPER

An alloy of copper and 2-3% beryllium with optionally fractional percentages of nickel or cobalt. Alloys of this series show remarkable age-hardening properties and an ultimate hardness of about 400 Brinell (Rockwell C43). Because of such hardness and good electrical conductivity, beryllium-copper is used in electrical switches, springs, etc.

BESSEMER PROCESS

A steel making process in which air is blown through the molten iron so that the impurities are thus removed by oxidation.

BILLET

(See Bloom)

BINARY ALLOY

An alloy containing two elements, apart from minor impurities, as brass containing the two elements copper and zinc.

BLACK ANNEALING

A process of box annealing or pot annealing ferrous alloy sheet, strip or wire after hot working and pickling. (See Box Annealing)

BLACK OIL TEMPERED SPRING STEEL STRIP

(Scaleless Blue.) A flat cold rolled usually .70/.80% medium high carbon spring steel strip, blue-black in color, which has been quenched in oil and drawn to desired hardness. While it looks and acts much like blue tempered spring steel and carries a Rockwell hardness of C44/47, it has not been polished and is lower in carbon content. Used for less exacting requirements than clock spring steel, such as snaps, lock springs, hold down springs, trap springs, etc. It will take a more severe bend before fracture than will clock spring, but it does not have the same degree of spring-back.

BLACK PLATE

A light weight or a thin uncoated steel sheet or strip so called because of its dark oxide coloring prior to pickling. It is manufactured by two different processes. (1) From sheet bar on single stand sheet mills or sheer mills in tandem. This method is now almost obsolete. (2) On modern, high speed continuous tandem cold reduction mills from coiled hot rolled pickled wide strip into ribbon wound coils to finished gage. Sizes range from 12” to 32” in width, and in thicknesses from 55 lbs. to 275 lbs. base box weight. It is used either as is for stampings, or may be enameled or painted or tin or terne coated.

BLAST FURNACE

A vertical shaft type smelting furnace in which an air blast is used, usually hot, for producing pig iron . The furnace is continuous in operation using iron ore, coke, and limestone as raw materials which are charged at the top while the molten iron and slag are collected at the bottom and are tapped out at intervals.

BLAST BOX

(See Tin Plate Base Box)

BLISTER

A defect in metal produced by gas bubbles either on the surface or formed beneath the surface while the metal is hot or plastic. Very fine blisters are called “pin-head” or “pepper” blisters.

BLOOM

(Slab, Billet, Sheet-Bar.) Semifinished products, hot rolled from ingots. The chief differences are in their cross sectional areas in ratio of width to thickness, and in their intended use.

BLOOMING-MILL

A mill used to reduce ingots to blooms, billets, slabs, sheet-bar etc. (See Semi-Finished Steel)

BLOWHOLE

A cavity produced during the solidification of metal by evolved gas, which in failing to escape is held in pockets.

BLUE ANNEALING

A process of softening ferrous alloys in the form of hot rolled sheet, by heating in the open furnace to a temperature within the transformation range and then cooling in air. The formation of bluish oxide on the surface is incidental.

BLUE BRITTLENESS

Reduced ductility occurring as a result of strain aging, when certain ferrous alloys are worked between 300?and 700 癒. This phenomenon may be observed at the working temperature or subsequently at lower temperatures.

BLUE TEMPERED SPRING STEEL STRIPS

(See Tempered Spring Steel Strip)

BLUING

(1) Sheets - A method of coating sheets with a thin, even film of bluish-black oxide, obtained by exposure to an atmosphere of dry steam or air, at a temperature of about 1000 癒, generally this is done during box-annealing. (2) Bluing of tempered spring steel strip; an oxide film blue in color produced by low temperature heating.

BODY-CENTERED

(Concerning space lattices.) Having the equivalent lattice points at the corners of the unit cell, and at its center; sometimes called centered or space-centered.

BONDERIZING

The coating of steel with a film composed largely of zinc phosphate in order to develop better bonding surface for paint or lacquer.

BORON

(Chemical Symbol B)- Element No. 5 of the periodic system. Atomic weight 10.82. It is gray in color, ignites at about 1112 癒. and burns with a brilliant green flame, but its melting point in a non-oxidizing atmosphere is about 4000 癒. Boron is used in steel in minute quantities for one purpose only - to increase the hardenability as in case hardening and to increase strength and hardness penetration.

BOTTLE TOP MOLD

Ingot mold, with the top constricted; used in the manufacture of “capped steel,” the metal in the constriction being covered with a cap fitted into the bottleneck, which stops “rimming” action by trapping escaping gases.

BOW

(See Camber)

BOX ANNEALING

A process of annealing a ferrous alloy in a suitable closed metal container, with or without packing materials, in order to minimize oxidation. The charge is usually heated slowly to a temperature below the transformation range, but sometimes above or within it, and is then cooled slowly. This process is also called “close annealing” or “pot annealing.” (See Black Annealing)

BRAKE

A piece of equipment used for bending sheet: also called a “bar folder.” If operated manually, it is called a “hand brake”; if power driven, it is called a “press brake.”

BRALE

A diamond penetrator, conical in shape, used with a Rockwell hardness tester for hard metals.

BRASS (Cartridge)

Strip. 70% copper 30% zinc. This is one of the most widely used of the copper-zinc alloys; it is malleable and ductile; has excellent cold-working; poor hot working and poor machining properties; develops high tensile strength with cold-working. Temper is impaired by cold rolling and classified in hardness by the number of B & S Gages of rolling (reduction in thickness) from the previous annealing gage. Rated excellent for soft-soldering; good for silver alloy brazing or oxyacetylene welding and fair for resistance of carbon arc welding. Used for drawn cartridges, tubes, eyelet machine items, snap fasteners, etc.

BRASS SHIM

(See SHIM)

BRASS (Yellow)

Strip. 65% copper and 35% zinc. Known as “High Brass” or “Two to One Brass.” A copper-zinc alloy yellow in color. Formerly widely used but now largely supplanted by Cartridge Brass.

BRASSES

Copper base alloys in which zinc is the principal added element. Brass is harder and stronger than either of its alloying elements copper or zinc; it is malleable and ductile; develops high tensile with cold-working and not heat treatable for purposes of hardness development.

BRAZING

Joining metals by fusion of nonferrous alloys that have melting points above 800 癒. but lower than those of the metals being joined. This may be accomplished by means of a torch (torch brazing), in a furnace (furnace brazing) or by dipping in a molten flux bath (dip or flux brazing). The filler metal is ordinarily in rod form in torch brazing; whereas in furnace and dip brazing the work material is first assembled and the filler metal may then be applied as wire, washers, clips, bands, or may be integrally bonded, as in brazing sheet.

BREAK TEST

(For tempered steel) A method of testing hardened and tempered high carbon spring steel strip wherein the specimen is held and bent across the grain in a vice-like calibrated testing machine. Pressure is applied until the metal fractures at which point a reading is taken and compared with a

standard chart of brake limitations for various thickness range. (See Bend Test)

BRIDLING

The cold working of dead soft annealed strip metal immediately prior to a forming, bending, or drawing operation. A process designed to prevent the formulation of Luder's lines. Caution: Bridled metal should be used promptly and not permitted to (of itself) return to its pre-bridled condition.

BRIGHT ANNEALED WIRE

Steel wire bright drawn and annealed in controlled non-oxidizing atmosphere furnace.

BRIGHT ANNEALING

A process of annealing usually carried out in a controlled furnace atmosphere so that surface oxidation is reduced to a minimum and the surface remains relatively bright.

BRIGHT BASIC WIRE

Bright steel wire, slightly softer than Bright Bessemer Wire. Used for round head wood screws, bolts and rivets, electric welded chain, etc.

BRIGHT BESSEMER WIRE

Stiff bright steel wire of hard drawn temper. Normally drawn to size without annealing. Used for nails, flat head wood screws, cheap springs, etc.

BRIGHT COMMERCIAL FINISH

(See Finishes)

BRIGHT DIP

An acid solution into which articles are dipped to obtain a clean, bright surface.

BRINELL HARDNESS (Test)

A common standard method of measuring the hardness of certain metals. The smooth surface of the metal is subjected to indentation by a hardened steel ball under pressure or load. The diameter of the resultant indentation, in the metal surface, is measured by a special microscope and the Brinell hardness value read from a chart or calculated formula.

BRITTLENESS

A tendency to fracture without appreciable deformation.

BROACHING

Multiple shaving, accomplished by pushing a tool with stepped cutting edges along the work, particularly through holes.

BRONZE

Primarily an alloy of copper and tin but the name is now applied to other alloys not containing tin; e.g., aluminum, bronze, manganese bronze, and beryllium bronze. For varieties and uses of tin bronze see (Alpha Bronze and Phosphor Bronze).

BROWN & SHARPE GAGES (B & S)

A standard series of sizes arbitrarily indicated, as by numbers, to which the diameter of wire or thickness of sheet metal is usually made and which is used in the manufacture of brass, bronze, copper, copper-base alloys and aluminum. These gage numbers have a definite relationship to each other. By this system the decimal thickness is reduced by 50% every six gage numbers -while temper is expressed by the number of B S gage numbers as cold reduced in thickness from previous annealing. For each B & S gage number in thickness reduction, there is assigned a hardness value of ?hard. To illustrate: One number hard = ?hard, two numbers hard = ?hard, etc.

BUCKLE

Alternate bulges or hollows recurring along the length of the product with the edges remaining

relatively flat.

BURNING

Heating a metal beyond the temperature limits allowable for the desired heat treatment, or beyond the point where serious oxidation or other detrimental action begins.

BURNT

A term applied to a metal permanently damaged by overheating.

BURR

A thin ridge or roughness left by a cutting operation such as in metal slitting, shearing, blanking or sawing. This is common to a No. 3 slit edge in the case of steel.

BUTCHER SAW STEEL

A hardened, tempered, and bright polished high carbon spring steel strip (carbon content a bit higher than in wood band saw quality) with a Rockwell value of approximately C47/49.

BUTT WELDING

Joining two edges or ends by placing one against the other and welding them.

CAKE

A copper ingot rectangular in cross section intended for rolling.

CAMBER OR BOW

Edgewise curvature. A lateral departure of a side edge of sheet or strip metal from a straight line.

CAMERA SHUTTER STEEL

Hardened, tempered and bright polished extra flat and extra precision rolled. Carbon content 1.25, Chromium .15.

CAPPED STEEL

(See Bottle Top Mold)

CARBIDE

A compound of carbon with one or more metallic elements.

CARBON

(Chemical symbol C) - Element No. 6 of the periodic system; atomic weight 12.01; has three allotropic modifications, all non-metallic. Carbon is preset in practically all ferrous alloys, and has tremendous effect on the properties of the resultant metal. Carbon is also an essential compound of the cemented carbides. Its metallurgical use, in the form of coke, for reduction of oxides, is very extensive.

CARBON FREE

Metals and alloys which are practically free from carbon.

CARBON RANGE

In steel specifications, the carbon range is the difference between the minimum and maximum amount of carbon acceptable.

CARBON STEEL

Common or ordinary steel as contrasted with special or alloy steels, which contain other alloying metals in addition to the usual constituents of steel in their common percentages.

CARBURIZING

(Cementation) Adding carbon to the surface of iron-base alloys by absorption through heating the metal at a temperature below its melting point in contact with carbonaceous solids, liquids or gasses. The oldest method of case hardening.

CASE HARDENING

Carburizing and subsequently hardening by suitable heat-treatment, all or part of the surface portions of a piece of iron-base alloy.

CAST

(1) A term indicating in the annealed state as “Cast Spring Steel Wire.” (2) In reference to Bright or Polished Strip Steel or Wire, the word cast implies discoloration as a shadow. (3) A term implying a lack of straightness as in a coil set.

CAST STEEL

Any object made by pouring molten steel into molds.

CEMENTITE

A compound of iron and carbon known as “Iron Carbide,” which has the approximate chemical formula Fe3C containing 6.69% of carbon. Hard and brittle, it is the hard constituents of cast iron, and the normal form in which carbon is present in steel. It is magnetizable, but not as readily as ferrite.

CHARCOAL TIN PLATE

Tin Plate with a relatively heavy coating of tin (higher than the “Coke Tin Plate” grades).

CHATTER MARKS

(Defect) - Parallel indentations or marks appearing at right angles to edge of strip forming a pattern at close and regular intervals, caused by roll vibrations.

CHIPPING

A method for removing seams and surface defects with chisel or gouge so that such defects will not be working into the finished product. Chipping is often employed to remove metal that is excessive but not defective. Removal of defects by gas cutting is known as “deseaming” or “scarfing.”

CHROMIUM

(Chemical symbol Cr.) - Element No. 24 of the periodic system; atomic weight 52.01. It is of bright silvery color, relatively hard. It is strongly resistant to atmospheric and other oxidation. It is of great value in the manufacture of Stainless Steel as an iron-base alloy. Chromium plating has also become a large outlet for the metal. Its principal functions as an alloy in steel making; (1) increases resistance to corrosion and oxidation (2) increases hardenability (3) adds some strength at high temperatures (4) resists abrasions and wear (with high carbon).

CHROMIUM-NICKEL STEEL

Steel usually made by the electric furnace process in which chromium and nickel participate as alloying elements. The stainless steel of 18% chromium and 8% nickel are the better known of the chromium-nickel types.

CIGARETTE KNIFE STEEL

Hardened, tempered and bright polished. 1.25 Carbon content - Chromium .15. Accurate flatness necessary and a high hardness with Rockwell C 51 to 53. Usually sizes are 4 ?#148; wide and 6” wide x .004 to .010.

CLADDING

A process for covering one metal with another. Usually the surfaces of fairly thick slabs of two metals are brought carefully into contact and are then subjected to co-rolling so that a clad composition results. In some instances a thick electroplate may be deposited before rolling.

CLAD METAL

A composite metal containing two or three layers that have been bonded together. The bonding may

have been accomplished by co-rolling, welding, heavy chemical deposition or heavy electroplating.

CLUSTER MILL

A rolling mill where each of the two working rolls of small diameter is supported by two or more back-up rolls.

COBALT

(Chemical symbol Co.) Element No. 27 of the periodic system; atomic weight 58.94. A gray magnetic metal of medium hardness; it resists corrosion like nickel, which it resembles closely; melting point 2696 癒.; boiling point about 5250 癒.; specific gravity 8.9. It is used as the matrix metal in most cemented carbides and is occasionally electroplated instead of nickel, the sulfate being used as electrolyte. Its principal function as an alloy in tool steel; it contributes to red hardness by hardening ferrite.

COIL SET OR LONGITUDINAL CURL

A lengthwise curve or set found in coiled strip metals following its coil pattern. A departure from longitudinal flatness. It can be removed by roller or stretcher leveling from metals in the softer temper ranges.

COILS

Coiled flat sheet or strip metal - usually in one continuous piece or length.

COINING

A process of impressing images or characters of the die and punch onto a plane metal surface.

COKE PLATE

(Hot Dipped Tin Plate) Standard tin plate, with the lightest commercial tin coat, used for food containers, oil canning, etc. A higher grade is the best cokes, with special cokes representing the best of the coke tin variety. For high qualities and heavier coatings, see (Charcoal Tin Plate).

COIL BREAKS

Creases or Ridges appearing in sheets as parallel lines transverse to the direction of rolling and generally extending across the width of the sheet.

COIL WELD

A joint between two lengths of metal within a coil - which is not always visible in the cold reduced product.

COLD REDUCED STRIP

Metal strip, made from hot-rolled strip, by rolling on cold-reduction mills.

COLD REDUCTION

Reduction of metal size, usually by rolling or drawing particularly thickness, while the metal is maintained at room temperature or below the recrystallization temperature of the metal.

COLD ROLLED FINISH

Finish obtained by cold rolling plain pickled sheet or strip with a lubricant resulting in a relatively smooth appearance.

COLD ROLLING

Rolling metal at a temperature below the softening point of the metal to create strain hardening (work-hardening). Same as cold reduction, except that the working method is limited to rolling. Cold rolling changes the mechanical properties of strip and produces certain useful combinations of hardness, strength, stiffness, ductility and other characteristics known as tempers.

COLD SHORT

The characteristics of metals that are brittle at ordinary or low temperatures.

COLD SHUT

A defect produced during casting, causing an area in the metal where two portions of the metal in either a molten or plastic condition have come together but have failed to unite, fuse, or, blend into a solid mass. (See Lamination)

COLD WORKING

Plastic deformation, such as rolling, hammering, drawing, etc., at a temperature sufficiently low to create strain hardening (work-hardening). Commonly, the term refers to such deformation at normal temperatures.

COLUMBIUM

(Chemical Symbol Cb) - Element No. 41 of the periodic system. Atomic weight 92.91. It is steel gray in color and brilliant luster. Specific gravity 8.57. Melting point at about 4379 癒. It is used mainly in the production of stabilized austenitic chromium-nickel steels, also to reduce the air-hardening characteristics in plain chromium steels of the corrosion resistant type.

COMMERCIAL BRONZE

A copper-zinc alloy (brass) containing 90% copper and 10% zinc; used for screws, wire, hardware, etc. Although termed “commercial-bronze” it contains no tin. It is somewhat stronger than copper and has equal or better ductility.

COMMERCIAL FINISH

(See Finishes)

COMMERCIAL QUALITY STEEL SHEET

Normally to a ladle analysis of carbon limited at 0.15 max. A Standard Quality Carbon Steel Sheet.

CONTINUOUS CASTING

A casting technique in which the ingot is continuously solidified while it is being poured, and the length is not determined by mold dimensions.

CONTINUOUS FURNACE

Furnace, in which the material being heated moves steadily through the furnace.

CONTINUOUS PICKLING

Passing sheet or strip metal continuously through a series of pickling and washing tanks.

CONTINUOUS STRIP MILL

A series of synchronized rolling mill stands in which coiled flat rolled metal entering the first pass (or stand) moves in a straight line and is continuously reduced in thickness (not width) at each subsequent pass. The finished strip is recoiled upon leaving the final or finishing pass.

CONTROLLED ATMOSPHERE FURNACES

A furnace used for bright annealing into which specially prepared gases are introduced for the purposes of maintaining a neutral atmosphere so that no oxidizing reaction between metal and atmosphere takes place.

CONVERTER

A furnace in which air is blown through the molten bath of crude metal or matte for the purpose of oxidizing impurities.

COOLING STRESSES

Stresses develop by uneven contraction or external constraint of metal during cooling; also those stresses resulting from localized plastic deformation during cooling and retained.

COPPER

(Chemical symbol Cu) - Element No. 29 of the periodic system, atomic weight 63.57. A

characteristically reddish metal of bright luster, highly malleable and ductile and having high electrical and heat conductivity; melting point 1981 癈.; boiling point 4237 癈.; specific gravity 8.94. Universally used in the pure state as sheet, tube, rod and wire and also as alloyed by other elements (See Brass and Bronze), as an alloy with other metals.

CORE WOUND FLAT WIRE

(See Oscillated Wound Coils)

CORROSION

Gradual chemical or electrochemical attack on a metal by atmosphere, moisture or other agents.

CORROSION EMBRITTLEMENT

The embrittlement caused in certain alloys by exposure to a corrosive environment. Such material is usually susceptible to the intergranular type of corrosion attack.

CORRUGATED

As a defect. Alternate ridges and furrows. A series of deep short waves.

CREEP

The flow or plastic deformation of metals held for long periods of time at stresses lower than the normal yield strength. The effect is particularly important if the temperature of stressing is above the recrystallization temperature of the metal.

CRITICAL POINTS

Temperatures at which internal changes or transformations take place within a metal either on a rising or falling temperature.

CRITICAL RANGE

A temperature range in which an internal change takes place within a metal. Also termed Transformation Range.

CROP

The defective ends of a rolled or forged product which are cut off and discarded.

CROSS BREAK

(See Luders Lines) This term also applies to transverse ribs or ripples.

CROSS DIRECTION

(In rolled or drawn metal) The direction parallel to the axis of the rolls during rolling. The direction at, right angles to the direction of rolling or drawing.

CROSS ROLLING

Rolling at an angle to the long dimension of the metal; usually done to increase width.

CROWN OR HEAVY CENTER

Increased thickness in the center of metal sheet or strip as compared with thickness at the edge.

CRUCIBLE

A ceramic pot or receptacle made of graphite and clay, or other refractory materials, and used in the melting of metal. The term is sometimes applied to pots made of cast iron, cast steel or wrought steel.

CRYSTAL

(1) A physically homogeneous solid, in which the atoms , ions, or molecules are arranged in a three-dimensional repetitive pattern. (2) A coherent piece of matter, all parts of which have the same anisotropic arrangement of atoms; in metals, usually synonymous with “grain” and “crystallite.”

CRYSTALLINE

Composed of crystals.

CRYSTALLIZATION

The formation of crystals by the atoms assuming definite positions in a crystal lattice. This is what happens when a liquid metal solidifies. (Fatigue, the failure of metals under repeated stresses, is sometimes falsely attributed to crystallization.)

CUBE-CENTERED

Metallography - (Concerning space lattices) - Body-centered cubic. Refers to crystal structure.

CUP FRACTURE

A type of fracture in a tensile test specimen which looks like a cup having the exterior portion extended with the interior slightly depressed.

CUP TEST

(See Olsen Ductility Test)

CYANIDING

Surface hardening of an iron-base alloy article or portion of it by heating at a suitable temperature in contact with a cyanide salt, followed by quenching.

DEAD FLAT

Perfectly flat. As pertaining to sheet, strip or plate. (See Stretcher Leveling)

DEAD SOFT ANNEALING

Heating metal to above the critical range and appropriately cooling to develop the greatest possible commercial softness or ductility.

DEAD SOFT STEEL

Steel, normally made in the basic open-hearth furnace or by the basic oxygen process with carbon less than 0.10% and manganese in the 0.20-0.50% range, completely annealed.

DEAD SOFT TEMPER

(No. 5 TEMPER) - Condition of maximum softness commercially attainable in wire, strip, or sheet metal in the annealed state.

DEBURRING

A method whereby the raw slit edge of metal is removed by rolling or filing.

DECARBURIZATION

Removal of carbon from the outer surface of iron or steel, usually by heating in an oxidizing or reducing atmosphere. Water vapor, oxygen and carbon dioxide are strong decarburizers. Reheating with adhering scale is also strongly decarburizing in action.

DEEP DRAWING

The process of cold working or drawing sheet or strip metal blanks by means of dies on a press into shames which are usually more or less cup-like in character involving considerable plastic deformation of the metal. Deep-drawing quality sheet or strip steel, ordered or sold on the basis of suitability for deep-drawing.

DEGASSING PROCESS

(In steel making) - Removing gases from the molten metal by means of a vacuum process in combination with mechanical action.

DELTA IRON

Allotropic modification of iron, stable above 2552 癒. to melting point. It is of body-centered cubic crystal structure.

DEOXIDIZING

Removal of oxygen. In steel sheet, strip, and wire technology, the term refers to heat treatment in a

reducing atmosphere, to lessen the amount of scale. (See Controlled Atmosphere Furnaces)

DIE-LINES

Lines of markings caused on drawn or extruded products by minor imperfections in the surface of the die.

DIE SINKING

Forming or machining a depressed pattern in a die.

DISH

A concave surface departing from a straight line edge to edge. Indicates transverse or across the width.

DOCTOR BLADE STEEL STRIP

A hardened and tempered spring steel strip, usually blued, produced from approximately .85 carbon cold rolled spring steel strip specially selected for straightness and good edges. Sometimes hand straightened or straightened by grinding and cut to desired lengths. This product is used in the printing trade as a blade to uniformly remove excess ink ("dope") from the rolls; hence its name.

DRAWING BACK

Reheated after hardening to a temperature below the critical for the purpose of changing the hardness of the steel. (See Tempering)

DRILL ROD

A term given to an annealed and polished high carbon tool steel rod usually round and centerless ground. The sizes range in round stock from .013 to 1 ?#148; diameter. Commercial qualities embrace water and oil hardening grades. A less popular but nevertheless standard grade is a non-deforming quality. Drill Rods are used principally by machinists and tool and die makers for punches, drills, taps, dowel pins, screw machine parts, small tools, etc.

DRY ROLLED FINISH

Finish obtained by cold rolling on polished rolls without the use of any coolant or metal lubricant, material previously plain pickled, giving a burnished appearance.

DUCTILITY

The property of metals that enables them to be mechanically deformed when cold, without fracture. In steel, ductility is usually measured by elongation and reduction of area as determined in a tensile test.

DURALUMIN

The trade name applied to the first aluminum-copper-magnesium type of age-hardenable alloy (17S), which contains nominally 4% Cu, ?% Mg. The term is sometimes used to include the class of wrought aluminum-copper-magnesium alloys that harden during aging at room temperature.

EARING

Wavy projections formed at the opera end of a cup or shell in the course of deep drawing because of differences in directional properties. Also termed scallop. (See Non-Scalloping Quality Strip Steel)

EDGES

Many types of edges can be produced in the manufacture of flat rolled metal products. Over the years the following types of edges have become recognized as standard in their respective fields.

COPPER BASE ALLOYS

Slit, Slit and Edge Rolled, Sheared, Sawed, Machined or Drawn,

SHEET STEELS OR ALUMINUM SHEET

Mill Edge, Slit Edge or Sheared Edge.

STRIP STEELS and STAINLESS STRIP

No. 1 Edge - A smooth, uniform, round or square edge, either slit or filed or slit and edge rolled as specified, width tolerance +/-.005".

No. 2 Edge - A natural round mill edge carried through from the hot rolled band. Has not been slit, filed, or edge rolled. Tolerances not closer than hot-rolled strip limits.

No. 3 Edge - Square, produced by slitting only. Not filed. Width tolerance close.

No. 4 Edge - A round edge produced by edge rolling either from a natural mill edge or from slit edge strip. Not as perfect as No. 1 edge. Width tolerances liberal.

No. 5 Edge - An approximately square edge produced by slitting and filing or slitting and rolling to remove burr.

No. 6 Edge - A square edge produced by square edge rolling, generally from square edge hot-rolled occasionally from slit strip. Width tolerances and finish not as exacting as No. 1 edge.

EDGE FILING

A method whereby the raw or slit edges of strip metal are passed or drawn one or more times against a series of files, mounted at various angles. This method may be used for deburring only or filing to a specific contour including a completely rounded edge.

EDGE STRAIN OR EDGE BREAKS

Creases extending in from the edge of the temper rolled sheet.

EDGEWISE CURVATURE

(See Camber)

EDGING

The dressing of metal strip edges by rolling, filing or drawing.

ELASTIC LIMIT

Maximum stress that a material will stand before permanent deformation occurs.

ELECTRIC FURNACE STEEL

Steel made in any furnace where heat is generated electrically, almost always by arc. Because of relatively high cost, only tool steels and other high-value steels are made by the electric furnace process.

ELECTROCLEANING

(Electrolytic Brightening) - An anodic treatment. A cleaning, polishing, or oxidizing treatment in which the specimen or work is made the anode in a suitable electrolyte; an inert metal is used as cathode and a potential is applied.

ELECTRO-GALVANIZING

Galvanizing by electrodeposition of zinc on steel.

ELECTROLYTIC POLISHING

(See Electrocleaning)

ELECTROLYTIC TIN PLATE

Black Plate that has been tin plated on both sides with commercially pure tin by electrodeposition. (See Tin Plating)

ELECTROPLATING

The production of a thin coating of one metal on another by electrodeposition. It is very extensively used in industry and is continuing to enlarge its useful functions. Various plated metals and

combinations thereof are being used for different purpose to illustrate:

1. Decoration and protection against corrosion……...copper, nickel and chromium.
2. Protection against corrosion……...cadmium or zinc
3. Protection against wear……..chromium
4. Build-up of a part or parts undersize……...chromium or nickel
5. Plate for rubber adhesion……brass
6. Protection against carburization and for brazing operations…....copper and nickel

ELONGATION

Increase in length which occurs before a metal is fractured, when subjected to stress. This is usually expressed as a percentage of the original length and is a measure of the ductility of the metal.

EMBOSSING

Raising or indenting a design in relief on a sheet or strip of metal by passing between rolls of desired pattern. (See Patterned or Embossed Sheet)

ENDURANCE LIMIT

Maximum alternating stress, which a given material will withstand for an indefinite number of times, without causing fatigue failure.

ERICHSEN TEST

Similar to the Olsen Test. Readings are in millimeters.

ETCHING

In metallography, the process of revealing structural details by the preferential attack of reagents on a metal surface.

EUTECTOID STEEL

Steel representing the eutectoid composition of the iron carbon system, with about 0.80% to 0.83% carbon, the eutectoid temperature being about 1333 癒. Such steel in the annealed condition consists exclusively of pearlite. Steels with less than this quota of carbon are known as hypo-eutectoid and contain free ferrite in addition to the pearlite. When more carbon is present, the steel is known as hyper-eutectoid and contains free cementite. The presence of certain elements, such as nickel or chromium, lowers the eutectoid carbon content.

EXPANDER STEEL

Hardened and tempered, blue polished. Carbon content about 1.00, Chromium .17. Used for the expanders in oil piston rings. Hardness 30 N 70 to 73. Range of sizes run for grooves 3/32” to ?#148; wide with the steel approximately .003% less than the grooves and thickness from .012 to .020”.

EXTENSOMETER

An apparatus for indicating the deformation of metal while it is subjected to stress.

EXTENSOMETER TEST

The measurement of deformation during stressing in the elastic range, permitting determination of elastic properties such as proportional limit, proof stress, yield strength by the offset method and so forth. Requires the use of special testing equipment and testing procedures such as the use of an extensometer or the plotting of a stress-strain diagram.

EXTRA HARD TEMPER

In brass mill terminology, Extra Hard is six B & S numbers hard or 50.15% reduction from the previous annealing or soft stage.

EXTRA SPRING TEMPER

In brass mill terminology, Extra Spring is ten numbers hard or 68.55% reduction in thickness from the previous annealing or soft stage.

EXTRUSION

Shaping metal into a chosen continuous form by forcing it through a die of appropriate shape.

FACE CENTERED

(Concerning cubic space lattices) - Having equivalent points at the corners of the unit cell and at the centers of its six faces. A face-centered cubic space lattice is characteristic of one of the close-packed arrangements of equal hard spheres.

FATIGUE

The phenomenon leading to fracture under repeated or fluctuating stress. Fatigue fractures are progressive beginning as minute cracks and grow under the action of fluctuating stress.

FERRITIC STAINLESS STEEL

Has a body centered cubic (BCC) structure. These alloys are the chromium stainless steels containing low carbon levels. They are hardenable primarily by cold working, although some will harden slightly by heat treating. Ferritic stainless steels work harden much slower than austentitic stainless steels.

FERROALLOY

An alloy of iron with a sufficient amount of some element or elements such as manganese, chromium or vanadium for use as a means in adding these elements into molten steel.

FERRO-MANGANESE

An alloy of iron and manganese (80% manganese) used in making additions of manganese to steel or cast-iron.

FERROUS

Related to iron (derived from the Latin ferrum.) Ferrous alloys are, therefore, iron base alloys.

FIBER OR FIBRE

Direction in which metals have been caused to flow, as by rolling, with microscopic evidence in the form of fibrous appearance in the direction of flow.

FIBER STRESS

Unit stress which exists at any given point in a structural element subjected to load; given as load per unit area.

FILED EDGES

Finished edges, the final contours of which are produced by drawing the strip over a series of small steel files. This is the usual and accepted method of dressing the edges of annealed spring steel strip after slitting in cases where edgewise slitting cracks are objectionable or slitting burr is to be removed.

FINISHED STEEL

Steel that is ready for the market without further work or treatment. Blooms, billets, slabs, sheet bars and wire rods are termed “semi-finished”.

FINISHES

The surface appearance of the various metals after final treatment such as rolling, etc. Over the years the following finishes have become recognized as standard in their respective fields.

ALUMINUM SHEET

(A) Commercially Bright.

(B) Bright one side.
(A) Bright both sides
(D) Embossed Sheets (Produced by using embossed rolls.)
BLACK PLATE
(A) Dull finish without luster produced by use of roughened rolls.
(B) Bright finish - a luster finish produced by use of rolls having a moderately smooth surface.
COLD ROLLED STEEL SHEETS
(A) Commercial Finish. A dull satin surface texture produced by roughened rolls.
(B) Commercial Bright Finish. Bright in appearance with a texture between luster and a very fine matte finish.
(C) Luster Finish. Produced by use of ground and polished rolls. (Note: This is not a number 3 finish.)
COLD ROLLED STRIP STEELS
No. 1 Finish - A dull finish produced without luster by rolling on roughened rolls.
No. 2 Finish - A regular bright finish produced by rolling on moderately bright rolls.
No. 3 Finish - Best Bright Finish. A lustrous or high gloss finish produced by rolling on highly polished rolls. Also referred to as "Mirror Finish".
COPPER BASE ALLOYS
Acid Dipped - Dry rolled finished. Produced by dry cold rolling bi-chromate dipped alloy with polished rolls, resulting in a burnished appearance and retaining the color obtained by dipping (True Metal Color).
Bright Dipped Finish - Finish resulting from an acid dip.
Buffed or Polished Surface - A finish obtained by buffing, resulting in a high gloss or polished finish.
Cold Rolled Finish - A relatively smooth finish obtained by cold rolling plain pickled strip with a lubricant.
Dry Rolled Finish - A burnished finish resulting from dry cold rolling by use of polished rolls without any metal lubricant.
Hot Rolled Finish - A dark relatively rough oxidized finish resulting from rolling the metal while hot. May subsequently be pickled or bright dipped but the rough surface remains.
Stretched Brushed Finish (Satin Finish) Obtained by mechanically brushing with wire brushes or by buffing.
FLAT WIRE
No. 2 Finish - A regular bright finish.
No. 3 Finish - Best Bright High Gloss finish produced by use of polished rolls. Or by special buffing - this is a negotiated finish.
STAINLESS COLD ROLLED SHEET and STRIP Nos. 1, 2B & 2D.
No. 1 Finish - C. R. Annealed and pickled appearance varies from dull gray matte finish to a fairly reflective surface.
No. 2B Finish - Same as No.1 Finish followed by a final light cold rolled pass generally on highly polished rolls.
No. 2D Finish - A dull cold rolled finish produced by cold rolling on dull rolls.
STAINLESS C.R. SHEET - Polished Finishes
No. 3 Finish - This is an intermediate polished finish.

No. 4 Finish - Ground and Polished finish.
No. 6 Finish - Ground, Polished and Tampico Brushed.
No. 7 Finish - Ground and High Luster Polished.
No. 8 Finish - Ground and Polished to Mirror Finish.
TEMPERED and UNTEMPERED COLD ROLLED CARBON SPRING STEEL STRIP
Classified by description as follows:
(A) Black Oil Tempered.
(B) Scaleless Tempered.
(A) Bright Tempered.
(D) Tempered and Polished.
(E) Tempered, Polished and Colored (Blue or Straw).
TIN PLATE
(A) Bright Hot Dipped Finish.
(B) Electro Matte Dull Finish.
(C) Electro Bright Reflow Finish - produced by the in-the-line thermal treatment following electrodeposition.
FINISHING TEMPERATURE
Temperature of final hot-working of a metal.
FLAME ANNEALING
A process of softening a metal by the application of heat from a high temperature flame.
FLAME HARDENING
A process of hardening a ferrous alloy by heating it above the transformation range by means of a high-temperature flame, and then cooling as required.
FLAPPER VALVE STEEL
An extremely flat, very smooth, very accurate to gage, polished, hardened and tempered spring steel produced from approximately 1.15% carbon. The name is derived from its common and principle usage.
FLATTENING
(See Roller and Stretcher Leveling)
FLAT LATCH NEEDLE STEEL
Supplied cold rolled and annealed. Carbon content .85. Supplied both in coil and flat length. Used to make flat latch needles which are used in the manufacture of knitted goods.
FLAT WIRE
A flat Cold Rolled, prepared edge section up to ?#148; wide, rectangular in shape. Generally produced from hot rolled rods or specially prepared round wire by one or more cold rolling operations, primarily for the purpose of obtaining the size and section desired. May also be produced by slitting cold rolled flat metal to desired width followed by edge dressing.
FLOWLINES
Always visible to a greater or less degree when a longitudinal section has been subjected to Macro etching, indicating the direction of work or rolling.
FLOW STRESS
The shear stress required to cause plastic deformation of solid metals.
FLUTING

Kinking or breakage due to curving of metal strip on a radius so small, with relation to thickness, as to stretch the outer surface above its elastic limit. Not to be confused with the specific product, Fluted Tubes.

FOIL

Metal in any width but no more than about 0.005" thick.

FOLDS

Defects caused in metal by continued fabrication of overlapping surfaces.

FRACTURE

Surface appearance of metals when broken.

FRACTURE TEST

Nicking and breaking a bar by means of sudden impact, to enable macroscopic study of the fracture.

FRICTION GOUGES OR SCRATCHES

A series of relatively short surface scratches variable in form and severity. (See Galling)

FULL ANNEALING

Used principally on iron and steel, means heating the metal to about 100 癈. above the critical temperature range, followed by "soaking" at this point and slow cooling below the critical temperature.

FULL FINISH PLATE

Steel sheet or strip reduced either hot or cold, cleaned, annealed, and then cold-rolled to a bright finish.

FULL HARD TEMPER

(A) No. 1 Temper. In low carbon sheet or strip steel, stiff and springy, not suitable for bending in any direction. It is the hardest temper obtainable by hard cold rolling. (B) In Stainless Steel Strip, tempers are based on minimum tensile or yield strength. For Chromium-Nickel grades Full Hard temper is 185,000 TS, 140,000 YS Min. Term also used in connection with copper base alloys and considered synonymous with Hard Temper.

GAGES

(Metal) - Mfrs. standard numbering systems indicating decimal thickness or diameters.

GALLING

The damaging of one or both metallic surfaces by removal of particles from localized areas due to seizure curing sliding friction.

GALVANIZING

Coating steel with zinc and tin (principally zinc) for rust proofing purposes. Formerly for the purpose of galvanizing, cut length steel sheets were passed singly through a bath of the molten metal. Today's galvanizing processing method consists of uncoiling and passing the continuous length of successive coils either through a molten bath of the metal termed Hot Dipped Galvanizing or by continuously zinc coating the uncoiled sheet electrolytically - termed Electro-Galvanizing.

GAMMA IRON

The form of iron stable between 1670 癈., and characterized by a face-centered cubic crystal structure.

GILDING METAL

A copper-zinc alloy containing 95% copper and 5% zinc. While similar to deoxidized copper in physical properties, it is somewhat stronger and very ductile. It has thermal and electrical

conductivity slightly better than half that of electrolytic copper and corrosion resistance comparable to copper.

GRAIN

A solid polyhedral (or many sided crystal) consisting of groups of atoms bound together in a regular geometric pattern. In mill practice grains are usually studied only as they appear in one plane. (1) Direction of: Refers to grain fiber following the direction of rolling and parallel to edges of strip or sheets. (2) To bend across the grain is to bend at right angles to the direction of rolling. (3) To bend with the grain is to bend parallel to the direction of rolling. In steel, the ductility in the direction of rolling is almost twice that at right angles to the direction of rolling.

GRAIN BOUNDARY

Bounding surface between crystals. When alloys yield new phases (as in cooling), grain boundaries are the preferred location for the appearance of the new phase. Certain deteriorations, such as season cracking and caustic embrittlement, occur almost exclusively at grain boundaries.

GRAIN GROWTH

An increase in metallic crystal size as annealing temperature is raised; growth occurs by invasion of crystal areas by other crystals.

GRAINS

Individual crystals in metals.

GRAIN SIZE

Average diameter of grains in the metal under consideration, or alternatively, the number of grains per unit area. Since increase in grain size is paralleled by lower ductility and impact resistance, the question of general grain size is of great significance. The addition of certain metals affects grain size, for example vanadium and aluminum tend to give steel a fine grain. The ASTM has set up a grain size standard for steels, and the McQuaid-Ehn Test has been developed as a method of measurement.

GRANULATED

A coarse grain or pebbly surface condition which becomes evident during drawing. (See Orange Peel)

GRANULATION

The formation of grains immediately upon solidification.

GRAPHITIZING

A heating and cooling process by which the combined carbon in cast iron or steel is transformed, wholly or partly, to graphitic or free carbon.

GROUND FLAT STOCK

Annealed and preground (to close tolerances) tool steel flats in standard sizes ready for tool room use. These are three common grades; water hardening, oil hardening and air hardening quality.

GUIDE

Device for holding the metal in the proper position, during rolling, or slitting.

GUIDE SCRATCH

(Defect) - Scratches or marks appearing parallel to edges of cold rolled strip caused by scale or other articles which have become imbedded in or have adhered to the rolling mill guide. Also applies to similar scratches appearing as a result of slitting.

HALF HARD TEMPER

(A) No. 2 Temper. In low carbon cold-rolled strip steel, produced by cold rolling to a hardness next

to but somewhat softer than full hard temper. (B) In brass Stainless Steel Strip, tempers are based on minimum tensile or yield strength. For Chromium-Nickel grades Half-Hard Temper 150,000 TS., 110,000 YS. Min.

HARD DRAWING

Drawing metal wire through a die to reduce cross section and increase tensile strength.

HARD DRAWN

Wire or tubing drawn to high tensile strength by a high degree of cold work.

HARD DRAWN SPRING STEEL WIRE

A medium high carbon cold drawn spring steel wire. Used principally for cold springs.

HARDENABILITY

The ability of a metal, usually steel, to harden in depth as distinguished from the terms “hardness.”

HARDENED AND TEMPERED SPRING STEEL STRIP

A medium or high carbon quality steel strip which has been subjected to the sequence of heating, quenching and tempering.

HARDENING

Any process which increases the hardness of a metal. Usually heating and quenching certain iron base alloys from a temperature either within or above the critical temperature range.

HARDNESS

Degree to which a metal will resist cutting, abrasion, penetration, bending and stretching. The indicated hardness of metals will differ somewhat with the specific apparatus measuring hardness. (See Brinell Hardness, Rockwell Hardness, Vickers Hardness, Scleroscope Hardness) Tensile Strength also is an indication of hardness.

HARD TEMPER

(A) For Steel see Full Hard Temper. (B) In brass mill terminology. Hard Temper is four B & S numbers hard or 37.1 % reduction.

HEAT OF STEEL

The product of a single melting operation in a furnace, starting with the charging of raw materials and ending with the tapping of molten metal and consequently identical in its characteristics.

HEAT TREATMENT

Altering the properties of a metal by subjecting it to a sequence of temperature changes, time of retention at specific temperature and rate of cooling therefore being as important as the temperature itself. Heat treatment usually markedly affects strength, hardness, ductility, malleability, and similar properties of both metals and their alloys.

HIGH BRASS

65% - A copper-zinc alloy containing 35% zinc. Possesses high tensile strength and is used for springs, screws, rivets, etc.

HOOKE’S LAW

Stress is proportional to strain in the elastic range. The value of the stress at which a material ceases to obey Hooke’s law is known as the elastic limit.

HOT DIP

In steel mill practice, a process whereby ferrous alloy base metals are dipped into molten metal, usually zinc, tin or terne, for the purpose of fixing a rust resistant coating.

HOT SHORT

Brittleness in hot metal.

HOT TOP

(See Sinkhead)

HOT WORKING

Plastic deformation of metal at a temperature sufficiently high not to create strain hardening. The lower limit of temperature for this process is the recrystallization temperature.

HYDROGEN EMBRITTLEMENT

(1) Brittleness of metal, resulting from the occlusion of hydrogen (usually as a by-product of pickling or by co-deposition in electroplating). (2) A condition of low ductility resulting from hydrogen absorption and internal pressure developed subsequently. Electrolytic copper exhibits similar results when exposed to reducing atmosphere at elevated temperature.

HYPEREUTECTOID STEEL

A steel having more than the eutectoid percentage of carbon. (See Eutectoid Steel)

HYPOEUTECTOID STEEL

Steel with less than eutectoid percentage of carbon. (See Eutectoid Steel)

IMPACT TEST

Test designed to determine, the resistance of metal to breakage by impact, usually by concentrating the applied stress to a notched specimen.

INCLUSION

Particles of impurities (usually oxides, sulfides, silicates, etc.) that are held mechanically or are formed during the solidification or by subsequent reaction within the solid metal.

INDENTATION HARDNESS

The resistance of a material to indentation. This is the usual type of hardness test, in which a pointed or rounded indenter is pressed into a surface under a substantially static load.

INDUCTION HARDENING

A process of hardening a ferrous alloy by heating it above the transformation range by means of electrical induction, and then cooling as required.

INDUCTION HEATING

A process of heating by electrical induction.

INGOT

A casting for subsequent rolling or forging.

INHIBITOR

A substance which retards some specific chemical reaction. Pickling inhibitors retard the dissolution of metal without hindering the removal of scale from steel.

INTERLEAVING

The placing of a sheet of paper between two adjacent layers of metal to facilitate handling and shearing of rectangular sheets, or to prevent sticking or scratching.

INTERMEDIATE ANNEALING

An annealing treatment given to wrought metals following cold work hardening for the purpose of softness prior to further cold working. (See Process Annealing)

INTERRUPTED AGING

The aging of an alloy at two or more temperatures by steps, and cooling to room temperatures after each step. Compare with Progressive Aging.

IRON

(Chemical Symbol Fe.) Element No. 26 of the periodic system; Atomic weight 55.85. A magnetic

silver-white metal of high tensile strength ductile and malleable. Melting point of pure iron about 2795 癒. Chemically iron is chiefly base forming. The principal forms of commercial iron are steel, cast iron and wrought iron.

IRONING

Thinning the walls of deep drawn articles by reducing the clearance between punch and die.

ISOTHERMAL ANNEALING

A process on which a ferrous alloy is heated to produce a structure partly or wholly austenitic, and is then cooled to and held at a temperature that causes transformation of the austenite to a relatively soft ferrite-carbide aggregate.

Metal Terminology JJIG SAW STEEL

Hardened, tempered and bright polished with round edges. Carbon content .85%. Range of sizes .039 to .393" in width and .016 to .039" in thickness.

Metal Terminology KKILLED STEEL

The term "killed" indicates that the steel has been sufficiently deoxidized to quiet the molten metal when poured into the ingot mold. The general practice is to use aluminum ferrosilicon or manganese as deoxidizing agents. A properly killed steel is more uniform as to analysis and is comparatively free from aging. However, for the same carbon and manganese content Killed Steel is harder than Rimmed Steel. In general all steels above 0.25% carbon are killed, also all forging grades, structural steels from 0.15% to 0.25% carbon and some special steels in the low carbon range. Most steels below 0.1

Metal Terminology LLADLE ANALYSIS

A term applied to the chemical analysis representative or in layers, as reported by the producer. Results are determined by analyzing a test ingot sample obtained during the pouring of the steel from a ladle.

LAMINATIONS

A defect appearing in sheets or strips as a segregation or in layers. To become divided, caused by gas pockets in the ingot. (See Cold Shut)

LAP

A surface defect appearing as a seam, caused by folding over hot metal, fins or sharp corners and then rolling or forging them into the surface but not welding them.

LAP-WELD

A term applied to a weld formed by lapping two pieces of metal and then pressing or hammering, and applied particularly to the longitudinal joint produced by a welding process for tubes or pipe, in which the edges of the skelp are beveled or scarfed so that when they are overlapped they can be welded together.

LATTICE

Space lattice. Lattice lines and lattice planes are lines and planes chosen so as to pass through collinear lattice points, and noncollinear lattice points, respectively.

LEAD ANNEALING

(See Bath Annealing)

LEVELING

Flattening rolled metal sheet or strip. (See Roller and Stretcher Leveling)

LIGHT METALS

Metals and alloys that have a low specific gravity, such as beryllium, magnesium and aluminum.

LITHOGRAPHIC SHEET ALUMINUM

Sheet having a superior surface on one side with respect to freedom from surface imperfections and supplied with a maximum degree of flatness, for use as a plate in offset printing.

LONG TERNE

A term applying to steel sheets that have been terne coated (Lead and Tin) by immersion in a bath of Terne Metal. (See Terne Plate)

LOW BRASS - 80% cu.

A copper-zinc alloy containing 20% zinc. Is a light golden color, very ductile, suitable for cupping, drawing, forming, etc. Because of its good strength and corrosion resistance it is used for flexible metal hoses, metal bellows, etc.

LOW CARBON STEELS

Contain from 0.10 to 0.30% carbon and less than 0.60% manganese. (The product of Basic Oxygen, Bessemer, Open Hearth or Electric Processes.)

LUDERS LINES

(Steel) - Characteristic of No. 5 Temper - Not a defect in No. 5 dead soft temper. Long vein-like marks appearing on the surface of certain metals, in the direction of the maximum shear stress, when the metal is subjected to deformation beyond the yield point. Also called stretcher strains, similar occurrence in certain aluminum alloys, etc. (See Stretcher Strains)

M B GRADE

A term applied to Open-Hearth steel wire in the .45/75 carbon range either hard drawn or oil tempered. Oil tempered wire of M B and W M B types are the most widely used of all spring wire. Oil tempered wire is more suitable to precision forming and casting operations than hard drawn wire because of close control of tensile strength and superior straightness.

NOTE - M B, H B and extra H B designate Basic Open Hearth steels, while W M B, W H B and extra W H B designate Acid Open Hearth Steels. The chemical composition and the mechanical properties are the same for both basic and acid steel.

MACROETCH TEST

Consists of immersing a carefully prepared section of the steel in hot acid and of examining the etching surface to evaluate the soundness and homogeneity of the product being tested.

MACROGRAPH

A photographic reproduction of any object that has not been magnified more than ten times.

MACROSCOPIC

Visible either with the naked eye or under low magnification (as great as about ten diameters).

MACROSTRUCTURE

The structure of metal as revealed by macroscopic examination.

MAGNESIUM

(Chemical symbol Mg.) - Element No. 12 of the periodic system; atomic weight 24.305. Specific gravity 1.77 with a melting point of approximately 1160 癒. A silver-white light malleable, ductile metallic element that occurs abundantly in nature. The metal is used in metallurgical and chemical processes; in photography, in signaling, and in the manufacture of pyrotechnics because of the intense white light it produces on burning. MetalMart is the world's largest stocking distributor of Magnesium Alloys including; Sheet, Plate, Bar, Castings, Forgings, and Extrusions. Check out our Magnesium page for complete details.

MALLEABILITY

The property that determines the ease of deforming a metal when the metal is subjected to rolling or hammering. The more malleable metals can be hammered or rolled into thin sheet more easily than others.

MALLEABILIZING

A process of annealing white cast iron in such a way that the combined carbon is wholly or partly transformed to graphitic or free carbon or in some instances, part of the carbon is removed completely.

MANGANESE

(Chemical symbol Mn.) - Element No. 25 of the periodic system; atomic weight 54.93. Lustrous, reddish-white metal of hard brittle and, therefore, non-malleable character. The metal is used in large quantities in the form of Spiegel and Ferromanganese for steel manufacture as well as in manganese and many copper-base alloys. Its principal function is as an alloy in steel making: (1) It is a ferrite-strengthening and carbide forming element. It increases hardenability inexpensively, with a tendency toward embrittlement when too high carbon and too high manganese accompany each other. (2) It counteracts brittleness from sulfur.

MARTENSITE

A distinctive needle like structure existing in steel as a transition stage in the transformation of austenite. It is the hardest constituent of steel of eutectoid composition. It is produced by rapid cooling from quenching temperature and is the chief constituent of hardened carbon tool steels. Martensite is magnetic.

MARTENSITIC STAINLESS STEEL

Has a body centered tetragonal (BCT) structure. These alloys are chromium stainless steels with medium to high carbon levels. They work harden slowly in the annealed (soft) condition but can be heat-treated to very high tensile strengths.

MATRIX

The principal phase in which another constituent is embedded.

MATT OR MATTE FINISH

(Steel) - Not as smooth as normal mill finish. Produced by etched or mechanically roughened finishing rolls.

MECHANICAL PROPERTIES

Those properties of a material that reveal the elastic and inelastic reaction when force is applied, or that involve the relationship between stress and strain; for example, the modulus of elasticity, tensile strength and fatigue limit. These properties have often been designated as “physical properties,” but the term “mechanical properties” is much to be preferred. The mechanical properties of steel are dependent on its microstructure. (See Physical Properties)

MECHANICAL SPRING

Any spring produced by cold forming from any material with or without subsequent heat treatment.

MECHANICAL WORKING

Plastic deformation or other physical change to which metal is subjected, by rolling, hammering, drawing, etc. to change its shape, properties or structure.

MEDIUM-CARBON STEEL

Contains from 0.30% to 0.60% carbon and less than 1.00% manganese. May be made by any of the standard processes.

MELTING RANGE

The range of temperature in which an alloy melts, that is the range between solidus and liquidus temperatures.

METALLOGRAPHY

The science concerning the constituents and structure of metals and alloys as revealed by the microscope.

METALLOID

(a) Element intermediate in luster and conductivity between the true metals and non-metals. Arsenic, antimony, boron, tellurium, and selenium, etc., are generally considered metalloids; frequently one allotropic modification of an element will be non-metallic, another metalloid in character. Obviously, no hard and fast line can be drawn. (b) In steel metallurgy, metalloid in has a specialized, even of erroneous, meaning; is covers elements commonly present in simple steel; carbon, manganese, phosphorus, silicon and sulfur.

METAL SPRAYING

A process for applying a coating of metal to an object. The metal, usually in the form of wire, is melted by an oxyhydrogen or oxyacetylene blast or by an electric arc and is projected at high speed by gas pressure against the object being coated.

MICROSTRUCTURE

The structure of polished and etched metal and alloy specimens as revealed by the microscope.

MILL EDGE

The edge of strip, sheet or plate in the as rolled state. Unsheared.

MILL FINISH

A surface finish produced on sheet and plate. Characteristic of the ground finish used on the rolls in fabrication.

MODULUS OF ELASTICITY

(Tension) - Force which would be required to stretch a substance to double its normal length, on the assumption that it would remain perfectly elastic, i.e., obey Hooke's Law throughout the test. The ratio of stress to strain within the perfectly elastic range.

MODULUS OF RIGIDITY

Of a material suffering shear, the ratio of the intensity of the shear stress across the section to the shear strain, i.e., to the angle of distortion in radians; expressed on pounds or tons per square inch.

MOLD

A form of cavity onto which molten metal is poured to produce a desired shape.

MOLYBDENUM

(Chemical Symbol Mo) - Element No. 42 of the periodic system; atomic weight 95.95. Hard, tough metal of grayish-white color, becoming very ductile and malleable when properly treated at high temperatures; melting point 4748 癒 .; boiling point about 6600 癒; specific gravity 10.2. Pure molybdenum can best be obtained as a black powder, by reduction of molybdenum trioxide or ammonium molybdate with hydrogen. From this powder, ductile sheet and wire are made by powder metallurgy techniques; these are used on radio and related work. Its principal functions as an alloy in steel making: (1) Raises grain-coarsening temperature of austenite. (2) Deepens hardening. (3) Counteracts tendency toward temper brittleness. (4) Raises hot and creep strength, red hardness. (5) Enhances corrosion resistance in stainless steel. (6) Forms abrasion-resisting particles.

MUNTZ METAL

(A Refractory Alloy) - Alpha-beta brass, 60% copper and 40% zinc. Stronger than alpha-brass and used for castings and hot-worked (rolled, stamped, or extruded) products. High strength brasses are developed from this by adding other elements.

MUSIC WIRE

A polished high tensile strength cold drawn wire with higher tensile strength and higher torsional strength than any other material available. The high toughness characteristic of this material is obtained by the patenting. Such wire is purchased according to tensile strength, not hardness.

Metal Terminology NNATURAL AGING

Spontaneous aging of a supersaturated solid solution at room temperature.

NEEDLE CUTTER STEEL

Usually supplied quarter hard rolled, extra precision rolled with sheared edges. Carbon content 1.25% - Chromium .15%. Usually supplied in a 2" width from .002 to .035". Used for cutting the eye of needle and milling the latch in a latch needle.

NETWORK STRUCTURE

A structure in which the crystals of one constituent are surrounded by envelopes of another constituent which gives a network.

NICKEL

(Chemical symbol Ni) - Element No. 28 of the periodic system; atomic weight 58.69. Silvery white, slightly magnetic metal, of medium hardness and high degree of ductility and malleability and resistance to chemical and atmospheric corrosion; melting point 265l 癒.; boiling point about 5250 癒., specific gravity 8.90. Used for electroplating. Used as an alloying agent, it is of great importance in iron-base alloys in stainless steels and in copper-base alloys such as Cupro-nickel, as well as in nickel-base alloys such as Monel Metal. Its principal functions as an alloy in steel making: (1) Strengthens unquenched or annealed steels. (2) Toughens pearlitic-ferritic steels (especially at low temperature). (3) Renders high-chromium iron alloys austenitic.

NICKEL SILVER

Copper base alloys that contain 10-45% Zn. and 5-30% Ni.

NICKEL STEEL

Steel containing nickel as an alloying element. Varying amounts are added to increase the strength in the normalized condition to enable hardening to be performed in oil or air instead of water.

NITRIDING

The increase in hardness being the result of surface nitride formation. Certain alloying constituents, principal among them being aluminum, greatly facilitate the hardening reaction. In general, the depth of the case is less than with carburizing.

NITRIDING STEEL

Steel which is particularly suited for the nitriding process, that is, it will form a very hard and adherent surface upon proper nitriding (heating in a partially dissociated atmosphere of ammonia gas). Composition usually .20-.40% carbon, .90-1.50% chromium, .15-1.00% molybdenum, and .85-1.20% aluminum.

NON-FERROUS METALS

Metals or alloys that are free of iron or comparatively so.

NON-METALLIC INCLUSIONS

Impurities (commonly oxides), sulphides, silicates or similar substances held in metals

mechanically during solidification or formed by reactions in the solid state.

NON-REFRACTORY ALLOY

A term opposed to refractory alloy. A non-refractory alloy has malleability, that is, ease of flattening when subjected to rolling or hammering.

NON-SCALLOPING QUALITY STRIP STEEL

Strip steel ordered or sold on the basis of absence of unevenness, or ears, on the edges of the steel, when subjected to deep drawing.

NORMALIZING

A heat treatment applied to steel. Involves heating above the critical range followed by cooling in still air. Is performed to refine the crystal structure and eliminate internal stress.

NUMBER AS PERTAINING TO EDGE

(See Edge)

NUMBER AS PERTAINING TO HARDNESS

In copper base alloys industry; temper is referred to as so many numbers hard, i.e.; Yellow Brass Half Hard is termed 2 numbers hard. This term is derived from terminology used on the mill floor whereby temper or hardness is imparted by cold working and classified as to hardness by the number of Brown & Sharpe gages away from the soft or as-annealed state.

NUMBER AS PERTAINING TO TEMPER

(See Temper)

Metal Terminology OOIL HARDENING

A process of hardening a ferrous alloy of suitable composition by heating within or above the transformation range and quenching in oil.

OIL-HARDENING STEEL

Steel adaptable to hardening by heat treatment and quenching in oil.

OIL STAIN ALUMINUM

Stain produced by the incomplete burning of the lubricants on the surface of the sheet. Rolling subsequent to staining will change color from darker browns to lighter browns down to white.

OLSEN (DUCTILITY) TEST

A method of measuring the ductility and drawing properties of strip or sheet metal which involves determination of the width and depth of impression. The test simulating a deep drawing operation is made by a standard steel ball under pressure, continuing until the cup formed from the metal sample fractures. Readings are in thousandths of an inch. This test is sometimes used to detect stretcher straining and indicates the surface finish after drawing, similar to the Erichsen ductility test.

OPEN-HEARTH PROCESS

Process of making steel by heating the metal in the hearth of a regenerative furnace. In the basic open-hearth steel process, the lining of the hearth is basic, usually magnesite; whereas in the acid open-hearth steel process, an acid material, silica, is used as the furnace lining and pig iron, extremely low in phosphorous (less than 0.04%), is the raw material charged in.

OPEN SURFACE

Rough surface on black plate, sheet or strip, resulting from imperfections in the original steel bars from which the plate was rolled.

ORANGE PEEL

(Effect) - A surface roughening (defect) encountered in forming products from metal stock that has

a coarse grain size. It is due to uneven flow or to the appearance of the overly large grains usually the result of annealing at too high a temperature. Also referred to as “pebbles” and “alligator skin.”

ORE

A mineral from which metal is (or may be) extracted.

ORIENTATION

(Crystal) - Arrangement of certain crystal axes or crystal planes in a polycrystalline aggregate with respect to a given direction or plane. If there is any tendency for one arrangement to predominate, it is known as the preferred orientation. In the absence of any such preference, random orientation exists.

OSCILLATED WOUND OR SCROLL WOUND

A method of even winding metal strip or wire on to a reel or mandrel wherein the strands are uniformly overlapped. Sometimes termed “stagger wound” or “vibrated wound.” The opposite of ribbon wound.

OVERAGING

Aging under conditions of time and temperature greater than those required to obtain maximum strength.

OXIDATION

The addition of oxygen to a compound. Exposure to atmosphere sometimes results in oxidation of the exposed surface, hence staining or discoloration. This effect is increased with temperature increase.

OXIDE

Compound of oxygen with another element.

OXYGEN LANCE

A length of pipe used to convey oxygen onto a bath of molten metal

PACK ROLLING

Rolling two or more pieces of thin sheet at the same time, a method usually practiced in rolling sheet into thin foil.

PASS

A term indicating the process of passing metal through a rolling mill.

PATENTING

Treatment of steel, usually in wire form, in which the metal is gradually heated to about 1830 癒, with subsequent cooling, usually in air, in a bath of molten lead, or in a fused salt mixture held between 800 癒 and 1050 癒.

PATENT LEVELING

(See Stretcher Leveling)

PATTERNED OR EMBOSSED SHEET

A sheet product on which a raised or indented pattern has been impressed on either one or both surfaces by the use of rolls.

PEARLITE

Lamellar structure resembling mother of pearl. A compound of iron and carbon occurring in steel as a result of the transformation of austenite into aggregations of ferrite and iron carbide.

PERMALLOY

Nickel alloys containing about 20 to 60% Fe, used for their high magnetic permeability and electrical resistivity.

PERMANENT SET

Non-elastic or plastic, deformation of metal under stress, after passing the elastic limit.

PHOSPHOR BRONZE

Copper base alloys, with 3.5 to 10% of tin, to which has been added in the molten state phosphorous in varying amounts of less than 1% for deoxidizing and strengthening purposes. Because of excellent toughness, strength, fine grain, resistance to fatigue and wear, and chemical resistance, these alloys find general use as springs and in making fittings. It has corrosion resisting properties comparable to copper.

PHOSPHOR BRONZE STRIP

A copper-based alloy containing up to 10% tin, which has been deoxidized with phosphorous in varying amounts of less than 1 % (see Phosphor Bronze). Temper is imparted by cold rolling, resulting in greater tensile strength and hardness than in most copper-base alloys or either of its alloying elements copper or tin. The various tempers from “One Number Hard” to “Ten Numbers Hard” are classified in hardness by the number of B & S Gages reduction in dimension from the previous soft or as annealed state (See Brown & Sharpe Gages). It has excellent electrical properties, corrosion resistant comparable to copper; great toughness and resistance to fatigue. Rated good for soft soldering, silver alloy brazing, oxyacetylene, carbon arc and resistance welding.

PHOSPHORUS

(Chemical symbol P) - Element No. 15 of the periodic system; atomic weight 30.98. Non-metallic element occurring in at least three allotropic forms; melting point 111 癒.; boiling point 536 癒.; specific gravity 1.82. In steels it is usually undesirable with limits set in most specifications. However, it is specified as an alloy in steel to prevent the sticking of light-gage sheets; to a degree it strengthens low carbon steel; increases resistance to corrosion, and improves machinability in free-cutting steels. In the manufacture of Phosphor Bronze it is used as a deoxidizing agent.

PHOTOMICROGRAPH

A photographic reproduction of any object magnified more than ten diameters. The term micrograph may be used.

PHYSICAL PROPERTIES

Those properties familiarly discussed in physics, exclusive of those described under mechanical properties; for example, density, electrical conductivity, co-efficient of thermal expansion. This term often has been used to describe mechanical properties, but this usage is not recommended. (See Mechanical Properties)

PICKLING

The process of chemically removing oxides and scale from the surface of a metal by the action of water solutions of inorganic acids.

PICKLING PATCH

A defect in tin plate, galvanized or terne plated steel due to faulty pickling, leaving areas from which the oxide has not been completely removed.

PIG IRON

Iron produced by reduction of iron ore in a blast furnace. Pig iron contains approximately 92% iron and about 3.5% carbon. The balance is largely silicone and manganese with a small percentage of phosphorus, sulphur, and other impurities.

PINCH PASS TEMPER

(See Soft Skin Rolled Temper and/or Temper Rolling)

PINCHERS

Long fern like creases usually diagonal to the direction of rolling.

PINHOLES

Microscopic imperfections of the coatings, that is, microscopic bare spots, also microscopic holes penetrating through a layer or thickness of light gage metal.

PIPE

(Defect) - Contraction cavity, essentially cone-like in shape, which occurs in the approximate center, at the top and reaching down into a casting; caused by the shrinkage of cast metal.

PIT

(Defect) - A sharp depression in the surface of the metal.

PLANIMETRIC METHOD

A method of measuring grain size, in which the grains within a definite area are counted.

PLASTIC DEFORMATION

Permanent distortion of a material under the action of applied stresses.

PLASTICITY

The ability of a metal to be deformed extensively without rupture.

PLATING

A thin coating of metal laid on another metal. (See Electroplating, Galvanizing, Tinning and Tinplating)

POLISHED SURFACE

(Buffed Surface) - The finish obtained by buffing with rouge or similar fine abrasive, resulting in a high gloss or polish.

POLYMORPHISM

The ability of a material to exist in more than one crystallographic structure. Numerous metals change in crystallographic structure at transformation temperatures during heating or cooling. If the change is reversible, it is allotropy. The allotropy of iron, particularly the changes between the alpha body-centered and the gamma face centered form, is of fundamental importance in the hardening of steel.

POT

A vessel for holding molten metal. Also used to refer to the electrolytic reduction cell employed in winning certain metals, such as aluminum, from a fused electrolyte.

POT ANNEALING

Is the same as Box Annealing.

POURING

The transfer of molten metal from the ladle into ingot molds or other types of molds; for example, in castings.

POWDER METALLURGY

The art of producing metal powders and of utilizing metal powders for the production of massive materials and shaped objects.

PRECIPITATION HARDENING

A process of hardening an alloy in which a constituent precipitates from a supersaturated solid solution. (See also Age Hardening and Aging)

PRECIPITATION HEAT TREATMENT

Any of the various aging treatments conducted at elevated temperature to improve certain of the

mechanical properties through precipitation from solid solution. (See Artificial Aging, Interrupted Aging, and Progressive Aging)

PREHEATING

(1) A general term used to describe heating applied as a preliminary to some further thermal or mechanical treatment. (2) A term applied specifically to tool steel to describe a process on which the steel is heated slowly and uniformly to a temperature below the hardening temperature and is then transferred to a furnace in which the temperature is substantially above the preheating temperature. (3) Heating a metal to a relatively high temperature for a relatively long time in order to change the structure before working. Ingots are homogenized by preheating.

PRIMES

Metal products, such as sheet and plate, of the highest quality and free from visible surface defects.

PROCESS ANNEALING

In the sheet and wire industries, a process by which a ferrous alloy is heated to a temperature close to, but below, the lower limit of the transformation range and is subsequently cooled. This process is applied in order to soften the alloy for further cold working.

PROGRESSIVE AGING

An aging process in which the temperature of the alloy is continually increased during the aging cycle. The temperature may be increased in steps or by any other progressive method.

PROPORTIONAL LIMIT

The greatest stress that the material is capable of sustaining without a deviation from the law of proportionality of stress to strain. (Hooke's Law)

PUNCH

The movable part that forces the metal into the die in equipment for sheet drawing, blanking, coining, embossing and the like.

PUNCHING

Shearing holes in sheet metal with punch and die.

PYROMETER

An instrument of various types used for measuring temperatures.

Metal Terminology Q

QUARTER HARD (No 3 TEMPER)

(A) In low carbon cold-rolled strip steel, a medium soft temper produced by a limited amount of cold rolling after annealing. (B) In brass mill terminology. Quarter-Hard is one B and S number hard or 10.95% reduction. (C) In stainless steel terminology tempers are based on minimum tensile, or yield strength. For Chromium-Nickel grades Quarter Hard Temper is 125,000 T.S., 75,000 Y.S. min.

QUENCHING

In the heat treating of metals, the step of cooling metals rapidly in order to obtain desired properties; most commonly accomplished by immersing the metal in oil or water. In the case of most copper base alloys, quenching has no effect other than to hasten cooling.

QUENCH HARDENING

(Steel) - A process of hardening a ferrous alloy of suitable composition by heating within or above the transformation range and cooling at a rate sufficient to increase the hardness substantially. The process usually involves the formation of martensite.

Metal Terminology RRADIANT TUBE ANNEALING BOX

(See Annealing) - A box which is heated, inside, by means of tubes on which gas is burned; the hot tubes radiate their heat to the covered pile of metal, standing on the base of the box. Usually a protective atmosphere is maintained in the box to protect the metal from oxidation.

RADIOGRAPHY

A nondestructive method of internal examination in which metal objects are exposed to a beam of X-ray or gamma radiation. Differences in thickness, density or absorption, caused by internal defects or inclusions, are apparent in the shadow image either on a fluorescent screen or on photographic film placed behind the object.

RAGGED EDGES

Edges of sheet or strip which are torn, split, cracked, ragged or burred or otherwise disfigured.

RECIPROCAL LATTICE

(For a crystal) - A group of points arranged about a center in such a way that the line joining each point to the center is perpendicular to a family of planes in the crystal, and the length of this line is inversely proportional to their interplanar distance.

RECOVERY

The removal of residual stresses by localized plastic flow as the result of low-temperature annealing operations performed on cold worked metals without altering the grain structure or strength properties substantially.

RECRYSTALLIZATION

A process whereby a distorted grain structure of cold worked metals is replaced by a new, stress-free grain structure as a result of annealing above a specific minimum temperature for a specific time.

RED BRASS

85% Copper - A copper-zinc alloy containing approximately 15% zinc, used for plumbing pipe, hardware, condenser tubes. Because of its color, is used for vanity cases, coins, plaques, badges, etc. It is somewhat stronger than commercial bronze and is hardened more rapidly by cold working.

RED SHORTNESS

Brittleness in steel when it is red hot.

REDUCTION OF AREA

The percent of cross-sectional area the metal will “Neck Down” prior to breaking in tension.

% R.A. = Original area - Area after Fracture x 100

REFINING TEMPERATURE

A temperature, usually just higher than the transformation range, employed in the heat treatment of steel to refine the structure - in particular, the grain size.

REFLECTOR SHEET

An alclad product containing on one side a surface layer of high-purity aluminum superimposed on a core or base alloy of commercial-purity aluminum or an aluminum-manganese alloy. The high-purity coating imparts good polishing characteristics and the core gives adequate strength and formability.

REFRACTORY

A heat-resistant material, usually nonmetallic, which is used for furnace linings and such.

REFRACTORY ALLOY

A term applied to those alloys which due to hardness or abrasiveness present relative difficulty in maintaining close dimensional tolerances.

REPHOSPHORIZING

(Steel) - A Ladle-chemical treatment consisting of the addition of phosphorus as a work hardening agent when temper rolling black plate or sheet steel resulting in greater hardness and stiffness and with a corresponding loss in ductility.

NOTE - Black Plate in tempers T5 and T6 (R/B range 68/84) are temper rolled from Rephosphorized steel.

RESIDUAL STRESS

Macroscopic stresses that are set up within a metal as the result of non-uniform plastic deformation. This deformation may be caused by cold working or by drastic gradients of temperature from quenching or welding.

RESIDUALS

“Incidental” or “tramp” elements not named in a specification. These inclusions are usually due to contaminated scrap.

RESILIENCE

The tendency of welding process in which the work pieces are heated by the passage of an electric current through the contact. Such processes include spot welding, seam or line welding and percussion welding. Flash and butt welding are sometimes considered as resistance welding processes.

RESISTANCE WELDING

A type of welding process in which the work pieces are heated by the passage of an electric current through the contact. Such processes include spot welding, seam or line welding and percussion welding. Flash and butt welding are sometimes considered as resistance welding processes.

RIBBON WOUND

A term applied to a common method of winding strip steel layer upon layer around an arbor or mandrel.

RIFFLES

Waviness at the edge of sheet or strip.

RIMMED STEEL

Low-carbon steel in which incomplete deoxidation permits the metal to remain liquid at the top of the ingot, resulting in the formation of a bottom and side rim of considerable thickness. The rim is of somewhat purer composition than the original metal poured. If the rimming action is stopped shortly after pouring of the ingot is completed, the metal is known as capped steel. Most steels below 0.15% carbon are rimmed steels. For the same carbon and manganese content rimmed steel is softer than killed steel.

RIPPLE

(Defect) - A slight transverse wave or shadow mark appearing at intervals along the piece.

ROCKWELL HARDNESS (TEST)

A standard method for measuring the hardness of metals. The hardness is expressed as a number related to the depth of residual penetration of a steel ball or diamond cone (“brale”) after a minor load of 10 kilograms has been applied to hold the penetrator in position. This residual penetration is automatically registered on a dial when the major load is removed from the penetrator. Various dial readings combined with different major loads, give “scales” designated by letters varying from “A” to “H”; the “B” and “C” scales are most commonly in use.

ROENTGEN RAYS

(See X-rays)

ROLL FORMING

An operation used in forming sheet. Strips of sheet are passed between rolls of definite settings that bend the sheet progressively into structural members of various contours, sometimes called "molded sections."

ROLLED EDGES

Finished edges, the final contours of which are produced by side or edging rolls. The edge contours most commonly used are square corners, rounded corners and rounded edge.

ROLLED IN SCALE

A surface defect consisting of scale partially rolled into the surface of the sheet.

ROLLER LEVELING

Passing sheet or strip metal through a series of staggered small rolls so as to flatten the metal. This method is relatively ineffective in removing defects such as buckles, wavy edges, corrugations, twists, etc., or from steel in the higher hardness ranges.

ROLLING

A term applied to the operation of shaping and reducing metal in thickness by passing it between rolls which compress, shape and lengthen it following the roll pattern.

ROLLING DIRECTION

(In rolled metal) - The direction, in the plane of the sheet, perpendicular to the axes of the rolls during rolling.

ROLLING MILLS

Equipment used for rolling down metal to a smaller size or to a given shape employing sets of rolls tie contours of which determine or fashion the product into numerous intermediate and final shapes, e.g., blooms, slabs, rails, bars, rods, sections, plates, sheets and strip.

ROTARY SHEAR

(Slitting Machine) - A cutting machine with sharpened circular blades or disc-like cutters used for trimming edges and slitting sheet and foil. NOTE: Cutter discs are also employed in producing circles from flat sheets but with differently designed machines.

RULE DIE STEEL

A hardened and tempered medium high carbon spring steel strip sufficiently low hardness to take moderately sharp bends without fracture, intended for manufacture into rule dies for the purpose of cutting or stamping fabrics, paper, cardboard, plastics, and metal foil into desired shape.

SAE

Abbreviation for Society of Automotive Engineers. This organization has specified common and alloy steels and copper base alloys in accordance with a numerical index system allowing approximation of the composition of the metal. The last two digits indicate the carbon content, usually within 0.05%.

SALT SPRAY TEST

An accelerated corrosion test in which the metal specimens are exposed to a fine mist of salt water solution either continuously or intermittently.

SATIN FINISH

(See SCRATCH BRUSHED FINISH)

SCAB

(Scabby) - A blemish caused on a casting by eruption of gas from the mold face or by uneven mold

surface or occurring where the skin from a blowhole has partly burned away and is not welded.

SCALE

(See Scaling)

SCALELESS BLUE

(See Black Oil Tempered Spring Steel)

SCALING

(1) Oxidation of metal due to heat resulting in relatively heavy surface layers of oxide. (2) Removal of scale from metal.

SCALLOP

(See Ear)

SCALPING

Machining the surface layers from ingots, billets and slabs before fabrications.

SCARFING

Cutting surface areas of metal objects, ordinarily by using a gas torch. The operation permits surface defects to be cut from ingots, billets, or the edges of plate that are to be beveled for butt welding. (See Chipping)

SCLEROSCOPE HARDNESS (TEST)

A method for measuring the hardness of metal; a diamond-pointed hammer drops from a fixed distance through a tube onto the smoothed metal surface and the rebound distance, with a specified high-carbon steel as 100.

SCRAP

Material unsuitable for direct use but usable for reprocessing by remelting.

SCRATCH BRUSHED FINISH

Finish obtained by mechanically brushing the surface with wire bristle brushes, by buffing with greaseless compound or by cold rolling with wire bristled rolls of scratch etched finish.

SEAM

(A defect.) - On the surface of metal a crack that has been closed but not welded; usually produced by some defect either in casting or in working, such as blowholes that have become oxidized or folds and laps that have been formed during working. Similar to cold shut and laminations.

SEAM WELDING

An electric-resistance type of welding process, in which the lapped sheet is passed between electrodes of the roller type while a series of overlapping spot welds is made by the intermittent application of electric current.

SECONDS

The designation given to sheet or strip that has imperfections in moderate degree or extent, which may be classified in two general groups imperfections in the base material, or other manufacturing defects. This term is not used in connection with non-ferrous alloys.

SEGMENT STEEL

Used for laminated piston rings. Carbon content about .70%. Hardened and blue tempered with round edges. Hardness usually Rockwell's 30 N 68 to 71, width sizes vary from .058 to .163" and thickness' are .020, .024 and .030".

SEGREGATION

In an alloy, concentration of carbon or alloying elements at specific regions, usually as a result of the primary crystallization of one phase with the subsequent concentration of other elements in the

remaining liquid.

SELF-HARDENING STEEL

A steel containing sufficient carbon or alloying element, or both, to form martensite either through air hardening or, as in welding and induction hardening, through rapid removal of heat from a locally heated portion by conduction into the surrounding cold metal. (See Air-Hardening Steel)

SEMIFINISHED STEEL

Steel in the form of billets, blooms, etc., requiring further working before completion into finished steel ready for marking.

SEMIKILLED STEEL

Steel incompletely deoxidized, to permit evolution of sufficient carbon monoxide to offset solidification shrinkage.

SEMI-STEEL

Cast iron (not steel) of high quality, obtained by using a large percentage of steel scrap with the pig iron.

SHEAR

A type of cutting operation in which the metal object is cut by means of a moving blade and fixed edge or by a pair of moving blades that may be either flat or curved.

SHEAR CRACK

A diagonal, transgranular track caused by shear stresses.

SHIM

A thin flat hard metal strip produced to close tolerances; used primarily for tool, die and machine alignment purposes. In steel there are four general types: (1) Low Carbon Rockwell B 80/100; (2) Hard Rolled High Carbon Rockwell C 28/33; (3) Hardened and Tempered Spring Steel Rockwell C 44/51; (4) Austinitic Stainless Steel Rockwell C 35/45. Brass shim of commercial quality is also used and most generally specified as 2 Nos. Hard but may be 4 Nos. Hard.

SHORE HARDNESS TEST

(See Scleroscope Hardness)

SHORT

(See Brittleness)

SHORT TERNE

A term applying to terne coated (Lead and Tin) sheets with reference to Base Box sizes (14” x 20”). (See Terne Plate)

SHOT BLASTING

Cleaning surface of metal by air blast, using metal shot as an abrasive.

SHRINKAGE CAVITY

A void left in cast metals as a result of solidification shrinkage and the progressive freezing of metal towards the center.

SILICON

(Chemical Symbol Si) - Element No. 14 of the periodic system; atomic weight 28.06. Extremely common element, the major component of all rocks and sands; its chemical reactions, however, are those of a metalloid. Used in metallurgy as a deoxidizing scavenger. Silicon is present, to some extent, in all steels, and is deliberately added to the extent of approximately 4% for electric sheets, extensively used in alternating current magnetic circuits. Silicon cannot be electrodeposited.

SILICON STEEL

Steel usually made in the basic open-hearth or electric furnace, with about 0.50-5.% silicon, other elements are usually kept as low as possible. Because of high electrical resistance and low hysteresis loss, silicon sheet and strip are standard in electric magnet manufacture.

SILKY FRACTURE

A steel fracture that has a very smooth fine train or silky appearance.

SILVER SOLDERS

Alloys of silver, copper, zinc and other metals, melting between 650 and 875 癈. used for making strong yet moderately ductile joints that resist corrosion.

SINGLE-ACTION PRESS

A forming press that operates with a single function, such as moving a punch into a die with no simultaneous action for holding down the clank or ejecting the formed work.

SINKER STEEL

Used for making sinkers in hosiery making machinery. Supplied both hardened and tempered and cold rolled and annealed. Usually extra precision rolled and extra flat. Carbon content about 1.25%.

SINKHEAD OR HOT TOP

A reservoir insulated to retain heat and to hold excess molten metal on top of an ingot mold in order to feed the shrinkage of the ingot. Also called “shrink head” or “feeder head.”

SINTERED CARBIDE

Composite, containing carbides of extremely refractory metals, such as tungsten, tantalum, titanium, etc., cemented together by a relatively low-melting metal, such as cobalt acting as a matrix.

SINTERING

Converting powder into a continuous mass by heating to a temperature considerably below fusion, usually after preliminary compacting by pressure.

SKELP

A plate of steel or wrought iron from which pipe or tubing is made by rolling the skelp into shape longitudinally and welding or riveting the edges together.

SKIN

A thin surface layer that is different from the main mass of a metal object, in composition structure or other characteristics.

SLAB

(See Bloom)

SLAG

A product resulting from the action of a flux on the nonmetallic constituents of a processed ore, or on the oxidized metallic constituents that are undesirable. Usually slags consist of combinations of acid oxides with basic oxides, and neutral oxides are added to aid fusibility.

SLIT EDGES

The edges of sheet or strip metal resulting from cutting to width by rotary slitters.

SLITTING

Cutting sheet or strip metal to width by rotary slitters.

SLIVER

(Defect) - Loose metal piece rolled down onto the surface of the metal during the rolling operations.

SOAKING

Prolonged heating of a metal at selected temperature.

SOFT SKIN ROLLED TEMPER

(No.4 Temper) - In low carbon-rolled strip steel, soft and ductile. Produced by subjecting annealed strip to a pinch pass or skin rolling (a very light rolling).

SOLDER EMBRITTLEMENT

Reduction in ductility of a metal or alloy, associated with local penetration by molten solder along grain boundaries.

SOLDERING

Joining metals by fusion of alloys that have relatively low melting points most commonly, lead-base or tin-base alloys, which are the soft solders. Hard solders are alloys that have silver, copper, or nickel bases and use of these alloys with melting points higher than 800 癒. is generally termed brazing.

SOLUTION HEAT TREATMENT

A process in which an alloy is heated to a suitable temperature, is held at this temperature long enough to allow a certain constituent to enter into solid solution and is then cooled rapidly to hold the constituent in solution. The metal is left in a supersaturated, unstable state and may subsequently exhibit age hardening.

SORBITE

Structure of steel, resulting from the tempering of martensite. In a truly sorbitic structure, the cementite is completely dispersed in the matrix. The trend is to call this structure tempered martensite.

SORBITIC PEARLITE

Structure of steel resulting, on cooling under the proper conditions from the decomposition of austenite; has a fine, Lamellar appearance.

SPACE-CENTERED

(Concerning space lattices) - Body-centered.

SPACE LATTICE

(Crystal) - A system of equivalent points formed by the intersections of three sets of planes parallel to pairs of principal axes; the space lattice may be thought of as formed by the corners of the unit cells.

SPECIFIC GRAVITY

A numerical value representing the weight of a given substance as compared with the weight of an equal volume of water, for which the specific gravity is taken as 1.0000.

SPECTOGRAPH

(X-rays) - An instrument using an extended surface - a photographic plate or film, or a fluorescent screen - for receiving the X-ray diffraction pattern.

SPELTER

(Prime Western Specter). A low-grade of Virgin Zinc containing approximately 98% Zinc used in Galvanizing processes.

SPHEROIDIZING

Any process of prolonged heating and slow cooling of steel which will convert the carbide content into rounded or spheroid form.

SPIEGEL

High-manganese pig iron, containing 15-30% manganese, approximately 5% carbon, and less than 1% silicon, used in the manufacture of steel by the Bessemer, or basic open-hearth process.

SPINNING

The procedure of making sheet metal discs into hollow shapes by pressing the metal against a rotating form (spinning chuck) by a tool.

SPOT WELDING

An electric-resistance welding process in which the fusion is limited to a small area. The pieces being welded are pressed together between a pair of water-cooled electrodes through which an electrical current is passed during a very short interval so that fusion occurs over a small area at the interface between the pieces.

SPRING-BACK

An indicator of elastic stresses, frequently measured as the increase in diameter of a curved strip after removing it from the mandrel about which it was held. The measurement is employed as an indicator of the extent of recovery or relief of residual stresses that has been achieved by the transformation of elastic strain to plastic strain during heating or stress relieving.

SPRING STEEL

Steel, normally of the high-carbon or alloy type, used in the manufacture of springs, lending itself to appropriate heat treatment; usually made is the open hearth or electric furnace.

SPRING STEEL STRIP

Any of a number of strip steels produced for use in the manufacture of steel springs or where high tensile properties are requires marketed in the annealed state, hard rolled or as hardened and tempered strip.

SPRING TEMPER

In brass mill terminology, Spring Temper is eight numbers hard or 60.50% reduction.

STABILIZING ANNEAL

A treatment applied to austentic stainless steels that contain titanium or columbium. This treatment consists of heating to a temperature below that of a full anneal in order to precipitate the maximum amount of carbon at titanium carbide or columbium carbide. This eliminates precipitation at lower temperatures, which might reduce the resistance of the steel to corrosion.

STABILIZING TREATMENT

A thermal treatment designed to precipitate material from solid solution, in order to improve the workability, to decrease the tendency of certain alloys to age harden at room temperature, or to obtain dimensional stability under service at slightly elevated temperatures.

STAINLESS STEEL

Corrosion resistant steel of a wide variety, but always containing a high percentage of chromium. These are highly resistant to corrosion attack by organic acids, weak mineral acids, atmospheric oxidation, etc.

STAMPING

A term used to refer to various press forming operations in coining, embossing, blanking, and pressing.

STEAM BLUED

(See Bluing)

STEEL

Iron, malleable in at least one range of temperature below its melting point without special heat treatment substantially free from slag, and containing carbon more than about 0.05% and less than about 2.00%. Other alloying elements may be present in significant quantities, but all steels contain

at least small amounts of manganese and silicon, and usually as undesirable constituents, also sulfur and phosphorus.

STICKER

Steel sheets or strip adhering. Usually by fusion spots caused by overheating during box annealing.

STRAIGHT-CHROME

An iron alloy. A term indicating a group of stainless steels the principal alloying element of which is chromium in varying amounts from 4.00 to 27.00%.

STRAIN

Deformation produced on a body by an outside force. (See also Stress and Hooke's Law.)

STRAIN AGING

Aging induced by cold working. (See Aging)

STRAIN HARDENING

An increase in hardness and strength caused by plastic deformation at temperatures lower than the recrystallization range.

STRESS

Deforming force to which a body is subjected or the resistance which the body offers to deformation by the force. (See also Strain and Hooke's Law)

STRESS RELIEF

Low temperature annealing for removing internal stresses, such as those resulting in a metal from work hardening or quenching.

STRESS RELIEVING

Reducing residual stresses by heating.

STRETCH FORMING

A process of forming panels and cowls of large curvature by stretching sheet over a form of the desired shape. This method is more rapid than hammering and beating.

STRETCHER LEVELING

(Also termed "patent leveling.") A method of making metal sheet or strip dead flat by stretching.

STRETCHER STRAINS

Long vein-like marks appearing on the surface of certain metals, in the direction of the maximum shear stress, when the metal is subjected to deformation beyond the yield point. Also termed Luders Lines. (Not a defect in No. 5 dead soft temper.)

STRIP STEEL

(Cold Rolled) - A flat cold rolled steel product (Other than Flat Wire) 23 15/16" and narrower; under .250' in thickness, which has been cold reduced to desired decimal thickness and temper on single stand, single stand reversing, or tandem cold mills in coil form from coiled hot rolled pickled strip steel.

STRUCTURE

The arrangement of parts; in crystals, especially the shape and dimension of the unit cell, and the number, kinds and positions of the atoms within it.

SULFUR

(Chemical Symbol S.) - Element No. 16 of the periodic system; atomic weight 32.06. Non-metal occurring in a number of allotropic modifications, the most common being a pale-yellow brittle solid. In steel most commonly encountered as an undesired contaminant. However, it is frequently deliberately added to cutting stock to increase machinability.

TANDEM MILL

Arrangement of rolling mills, in direct line, allowing the metal to pass from one set of rolls into the next.

TAPPING

Transferring molten metal from melting furnace to ladle.

TARNISH

Surface discoloration on a metal, usually from a thin film of oxide or sulfide.

TEEMING

Pouring metal into ingot molds.

TELESCOPING

Transverse slipping of successive layers of a coil so that the edge of the coil is conical rather than flat.

TEMPER

The state of or condition of a metal as to its hardness or toughness produced by either thermal treatment or heat treatment and quench or cold working or a combination of same in order to bring the metal to its specified consistency. Each branch of the metal producing industry has developed its own system of temper designates. In flat rolled products including sheet and strip steel, tin mill products, stainless strip, aluminum sheet and copper base alloy strip; they are shown as follows:

ALUMINUM SHEET - (See Aluminum)

COPPER BASE ALLOYS (Cold Rolled) - B S Gage Numbers.

NOTE - Hardness is indicated condition while hardness varies with alloy changes.

Temper . . . . . Hardness

Annealed .....Commercially Soft

Quarter Hard .....One Number Hard

Half Hard .....Two Numbers Hard

Hard Temper .....Four Numbers Hard

Extra Hard .....Six Numbers Hard

Spring Temper .....Eight Numbers Hard

Extra Spring Temper .....Ten Numbers Hard

SHEET STEEL (Low Carbon Cold Rolled) - Temper Classifications.

Temper . . . . . .Rockwell

Full Hard . .....069 and thinner B 90 min.

.....070 and thinner B 84 min.

Half Hard .....Approx. R/B 70/85

Quarter Hard .....Approx. R/B 60/75

Soft Commercial Quality .....Approx. R/B 66 max.

Drawing Quality .....Approx. R/B 55 max.

STAINLESS STRIP STEEL (Cold Rolled Temper Classification) - Type 301.

NOTE - The various stainless strip tempers are based on specified minimum values for tensile strength or yield strength or both. However, because of custom, both distributors and customers alike rely on approximate Rockwell readings for temper classification. To illustrate:

Temper (Type 301) . . . . . Rockwell . . . . . Tensile Psi

Soft .....Approx. B 75/85 ..... 110,000 Min.

Quarter Hard .....Approx. C 25/30 ..... 125,000 Min.

Half Hard ..... Approx. C 30/35 ..... 150,000 Min.
Three Quarters Hard ..... Approx. C 35/40 ..... 175,000 Min.
Full Hard ..... Approx. C 40/45 ..... 185,000 Min.
Extra Hard (Type 301) ..... Approx. C 45 min ..... 200,000 Min.
Type 430 Soft ..... Approx. B 75/85 ..... 75/85,000

STRIP STEEL (Low Carbon Cold Rolled) - Temper Classifications.

Temper . . . . . Rockwell . . . . . Means Tensile
No. 1 Full Hard ..... .069 and thinner B 90 min. 80,000
..... .070 and thicker B 84 min. 80,000
No.2 Half hard ..... B 70/85 64,000
No.3 Quarter Hard ..... B 60/75 54,000
No.4 Skin Rolled ..... B 65 max. 48,000
No. 5 Dead Soft ..... B 55 max.

TEMPERED SPRING STEELS (Strip) - Temper indication is to Rockwell Hardness only.

TIN MILL PRODUCTS (Steel) Temper Classifications - NOT STANDARDIZED. FOR INFORMATION ONLY. (Not to be confused with the Cold Rolled Strip Steel Temper Numbering System wherein No. 1 Temper indicates Full Hard, while in the TIN MILL Product Numbering System No. 1 Temper indicates a soft condition.) The following Rockwell ranges are approx. only.

Temper-Number . . . . . Rockwell - 30 T Scale . . . . . .Rockwell B Scale
No. 1 Temper ..... Aim at 46/52 ..... Aim at 45/53
No. 2 Temper ..... Aim at 50/56 ..... Aim at 51/59
No. 21/2 Temper ..... Aim at 52/58 ..... Aim at 53/62
No. 3 Temper ..... Aim at 54/60 ..... Aim at 56/66
No.4 Temper ..... Aim at 58/64 ..... Aim at 62/71
*No. 5 Temper ..... Aim at 62/68 ..... Aim at 68/77
*No. 6 Temper ..... Aim at 62/73 ..... Aim at 75/84

*NOTE: Tempers 5 and 6 are temper rolled from rephosphorized steel in order to develop desired hardness and stiffness. The above temper classifications are used principally by producing mills and can manufacture but are not in general use in the sheet and strip industry.

TEMPERED and POLISHED SPRING STEEL STRIP

90/1.03% carbon range (Also known as clock spring steel.) - This product, while similar to general description under heading of Tempered Spring Steel Strip, is manufactured and processed with great and extreme care exercised in each step of its production. Manufactured from carbon range of .90/1.03% with Rockwell range C 48/51. Clock spring quality has been ground and polished with edges dressed. It is usually supplied dark blue in color and has a wide range of uses, such as coiled and flat mechanical springs, ignition vibrator springs, springs for timing devices, springs for the electric and electronic fields, steel tapes, rules, etc.

TEMPERED SPRING STEEL STRIP

Any medium or high carbon (excluding clock spring) strip steel of spring quality which has been hardened and tempered to meet specifications. Where specification calls for blue or straw color, same is accomplished by passing through heat prepared at proper temperature depending on color required. Blue is developed at approximately 600 癒.

TEMPERING

(Also termed “drawing.”) - A process of re-heating quench-hardened or normalized steel to a

temperature below the transformation range and then cooling at any rate desired. The primary purpose of tempering is to impart a degree of plasticity or toughness to the steel to alleviate the brittleness of its martensite.

TEMPER ROLLING

Subjecting metal sheet or strip to a slight amount of cold rolling following annealing (usually ?to 1 ?%) to forestall stretcher strains. Also termed “Pinch Pass” or “Skin Rolled.” (See Cold Rolling)

TENSILE STRENGTH

(Also called ultimate strength) - Breaking strength of a material when subjected to a tensile (stretching) force. Usually measured by placing a standard test piece in the jaws of a tensile machine, gradually separating the jaws, and measuring the stretching force necessary to break the test piece. Tensile strength is commonly expressed as pounds (or tons) per square inch of original cross section.

TENSILE TEST

(See Tensile Strength)

TERNARY ALLOY

An alloy that contains three principal elements.

TERNE PLATE

Sheet steel, coated with a lead-tin alloy. The percentage of tin is usually kept as low as possible because of its high cost; however, about 15% is normally necessary in order to obtain proper coating of the steel, since pure lead does not alloy with iron and some surface alloying is necessary for proper adhesion.

THERMOCOUPLE

A device for measuring temperatures by the use of two dissimilar metals in contact; the junction of these metals gives rise to a measurable electrical potential with changes in temperature.

THICKNESS GAGE OR FEELER STOCK

A hardened and tempered, edged, ground, and polished thin section, high carbon strip steel. Usually ?#148; in width and in thicknesses from .001 to .050” manufactured to extremely close tolerances. It is used primarily for determining measurement of openings by tool and die makers, machinists, and automobile technicians. It is prepared in handy pocket size knife-like holders containing an assembly of various thicknesses. Also prepared in standard 12” lengths with rounded ends in 10’ and 25’ coils. Universally used in the metal industry.

THREE-QUARTER HARD TEMPER

(A) In stainless steel strip tempers are based on a minimum tensile or yield strength. For Chromium-Nickel grades three-quarter hard temper is 175,000 T.S., 135,000 Y.S. min. (B) In Brass mill terminology, this temper is three B & S numbers hard or 29.4% thickness reduction.

TIN

(Chemical Symbol Sn) - Element No. 50 of the periodic system; atomic weight 118.70. Soft silvery white metal of high malleability and ductility, but low tensile strength; melting point 449 癒., boiling point 4384 癒., yielding the longest molten-state range for any common metal; specific gravity 7.28. Principal use as a coating on steel in tin plate; also as a constituent in alloys.

TINNING

Coating with tin, commonly either by immersion into molten tin or by electrodeposition; also by spraying.

TIN PLATE BASE BOX

A Tin Plate Base Box is measured in terms of pounds per Base Box (112 sheets 14" x 20") a unit peculiar to the tin industry. This corresponds to its area of sheet totaling to 31.360 square inches of any gage and is applied to tin plate weighing from 55 to 275 pounds per base box. To convert to decimal thickness multiply weight per base box by .00011.

TIN PLATING

Electroplating metal objects with tin; the object to be coated is made cathode (negative electrode) in an electrolytic bath containing a decomposable tin salt.

TITANIUM

(Chemical Symbol Ti) - Element No. 22 of the periodic system; atomic weight 47.90, melting point about 3270; boiling point over 5430; specific gravity 4.5. Bright white metal, very malleable and ductile when exceedingly pure. Its principal functions as an alloy in the making of steel (1) Fixes carbon in inert particles (a) reduces martensitic hardness and hardenability in medium chromium steel (b) prevents formation of austenite in high-chromium steels (c) prevents localized depletion of chromium in stainless steel during long heating. Now finding application in its own right because of its high strength and good corrosion resistance.

TOLERANCE LIMIT

The permissible deviation from the desired value.

TOOL STEEL

Any high carbon or alloy steel capable of being suitable tempered for use in the manufacture of tools.

TOUGHNESS

Property of resisting fracture or distortion. Usually measured by impact test, high impact values indicating high toughness.

TRACE

Extremely small quantity of an element, usually too small to determine quantitatively.

TRANSFORMATION

A constitutional change in a solid metal, e.g., the change from gamma to alpha iron, or the formation of pearlite from austenite.

TRANSFORMATION RANGE

Temperature range over which a chemical or metallurgical change takes place.

TRANSFORMATION TEMPERATURE

The temperature at which transformation occurs. The term is sometimes used to denote the limiting temperature of a transformation range.

TROOSITE

Tempered martensite that etches rapidly, usually appears dark, and is not resolved by the microscope.

TROWEL STEEL

Hardened and tempered spring steel. .90 to 1.05% carbon content. Ordinary tolerances, but rolled extra flat - Rockwell C 50. Used in the manufacture of plastering trowels.

TRUSS SPRING STEEL

Supplied cold rolled and bright annealed. Carbon content about .70% - Manganese .74%. Must be formed very severely and must be as free as possible from decarburization.

TUKON HARDNESS TEST

A method for determining micro-hardness by using a Knoop diamond indenter or Vickers square-

base pyramid indenter.

TUMBLING

Cleaning articles by rotating them in a cylinder with cleaning materials.

TUNGSTEN

(Chemical symbol W) - Element No. 74 of the periodic system; atomic weight 183.92. Gray metal of high tensile strength, ductile and malleable when specially handled. It is immune to atmospheric influences and most acids, but not to strong alkalies. The metal is used as filament and in thin sheet form in incandescent bulbs and radio tubes. (1) Forms hard abrasion resistant particles in tool steels. (2) Promotes hardness and strength at elevated temperatures.

TUNGSTEN CARBIDE

Compound of tungsten and carbon, of composition varying between WC and W2C; imbedded in matrix of soft metal, such as cobalt, extensively used for Sintered Carbide Tools.

TWIST

A winding departure from flatness.

Metal Terminology UULTIMATE STRENGTH

(See Tensile Strength)

UTILITY SHEET ALUMINUM

Mill finish coiled or flat sheet of unspecified composition and properties produced in specific standard sizes and suitable for general building trade usage.

UPSETTING

(1) A metal working operation similar to forging. (2) The process of axial flow under axial compression of metal, as in forming heads on rivets by flattening the end of wire.

VACUUM DEGASSING

(See Degassing Process)

VANADIUM

(Chemical Symbol V) - Element No. 23 of the periodic system; atomic weight 50.95. Gray-white, hard metal, unaffected by atmospheric influences or alkalies but soluble in most strong acids; melting point 31190 癒.; boiling point about 61500 癒.; specific gravity 5.87. It cannot be electrodeposited. Its principal functions as an alloy in the making of tool steels. (1) Elevates coarsening temperature of austenite (promotes fine grain). (2) Increases hardenability (when dissolved). (3) Resists tempering and causes marked secondary hardening.

VIBRATED WOUND

(See Oscillated Wound Coils)

VIBRATOR REED STEEL

Hardened, temper and white polished extra precision rolled. Carbon content about 1.00%. Steel must withstand great fatigue stresses.

VICKERS HARDNESS (TEST)

Standard method for measuring the hardness of metals, particularly those with extremely hard surfaces: the surface is subjected to a standard pressure for a standard length of time by means of a pyramid-shaped diamond. The diagonal of the resulting indention is measured under a microscope and the Vickers Hardness value read from a conversion table.

VIRGIN METAL

Metal obtained directly from ore and not used before.

Metal Terminology WWMB, WHB and EXTRA WHB GRADES

Spring steel wires produced from acid open-hearth steels (see notes at M B GRADE).

WASTERS

Sheets that have prohibited defects, for example seams and buckled plates. Generally fit for re-melting purposes only.

WATCH MAIN SPRING STEEL

Usually supplied cold rolled and annealed in large widths and cut and hardened by the spring manufacturers. Carbon content about 1.15% and Tungsten .17%, extra precision rolled.

WATER HARDENING

Process of hardening high carbon steels by quenching in water or brine after heating.

WAVY

Not flat. A slight wave following the direction of rolling and beyond the standard limitation for flatness.

WEDGE

A hardwood stick used as a forming tool in spinning.

WELDING

A process used to join metals by the application of heat. Fusion welding, which includes gas, arc, and resistance welding, requires that the parent metals be melted. This distinguishes fusion welding from brazing. In pressure welding, joining is accomplished by the use of heat and pressure without melting. The parts that are being welded are pressed together and heated simultaneously, so that recrystalization occurs across the interface.

WORK HARDENING

Increase in resistant to deformation (i.e. in hardness) produced by cold working.

WORKABILITY

The characteristic or group of characteristic that determines the ease of forming a metal into desired shapes.

WORMS

(See Stretcher Strains)

WROUGHT IRON

Iron containing only a very small amount of other elements, but containing 1-3% by weight of slag in the form of particles elongated in one direction, giving the iron a characteristic grain. Is more rust-resistant than steel and welds more easily.

Metal Terminology XX-RAYS

Light rays, excited usually by the impact of cathode rays on matter, which have wave lengths between about 10-6 cm, and 10-9 cm; also written X-rays, same as Roentgen rays.

Metal Terminology YYIELD POINT

The load per unit of original cross section at which, in soft steel, a marked increase in deformation occurs without increase in load.

YIELD STRENGTH (YS)

The stress (load/area) at which the metal changes from elastic to plastic in behavior, i.e., takes a permanent set.

YOUNG'S MODULUS

The coefficient of elasticity of stretching. For a stretched wire, Young's Modulus is the ratio of stretching force per unit cross-sectional area to the elongation per unit length. The values of Young's Modulus for metals are of the order 10 12 dynes per square cm. (See Modulus of

Elasticity)

Metal Terminology ZZINC

(Chemical Symbol Zn) - Element No. 30 of the periodic system. Atomic weight 65.38. Blue-white metal; when pure, malleable and ductile even at ordinary temperatures; melting point 7870 癒., boiling point 16650 癒., specific gravity 7.14. It can be electrodeposited and is used extensively as a coating for steel (See Galvanizing) and sheet. Zinc finds many outlets, such as dry batteries, etc. Zinc-base alloys are of great importance in die casting. Its most important alloy is brass.

ZIRCONIUM

(Chemical Symbol Zr.) - Element No. 40 of the periodic system. Atomic weight 91.22. Specific gravity 6.5 and melting point at about 3200?+/- 1300 癒. Because of its great affinity for oxygen and combines readily with nitrogen and sulfur, it is used as a deoxidizer and scavenger in steel making. It is used as an alloy with nickel for cutting tools and is used in copper alloys.

金属材料相关词汇

物料科学 Material Science

物料科学定义 Material Science Definition

加工性能 Machinability

强度 Strength

抗腐蚀及耐用 Corrosion resistance durability

金属特性 Special metallic features

抗敏感及环境保护 Allergic, re-cycling environmental protection

化学元素 Chemical element

元素的原子序数 Atom of Elements

原子及固体物质 Atom and solid material

原子的组成、大小、体积和单位图表 The size, mass, charge of an atom, and is particles (Pronton,Nentron and Electron)

原子的组织图 Atom Constitutes

周期表 Periodic Table

原子键结 Atom Bonding

金属与合金 Metal and Alloy

铁及非铁金属 Ferrous Non Ferrous Metal

金属的特性 Features of Metal

晶体结构 Crystal Pattern

晶体结构，定向格子及单位晶格 Crystal structure, Space lattice Unit cell
X 线结晶分析法 X – ray crystal analyics method
金属结晶格子 Metal space lattice
格子常数 Lattice constant
米勒指数 Mill's Index
金相及相律 Metal Phase and Phase Rule
固熔体 Solid solution
置换型固熔体 Substitutional type solid solution
插入型固熔体 Interstital solid solution
金属间化物 Intermetallic compound
金属变态 Transformation
变态点 Transformation Point
磁性变态 Magnetic Transformation
同素变态 Allotropic Transformation
合金平衡状态 Thermal Equilibrium
相律 Phase Rule
自由度 Degree of freedom
临界温度 Critical temperture
共晶 Eutectic
包晶温度 Peritectic Temperature
包晶反应 Peritectic Reaction
包晶合金 Peritectic Alloy
亚共晶体 Hypoeutetic Alloy
过共晶体 Hyper-ectectic Alloy
金属的相融、相融温度、晶体反应及合金在共晶合金、固熔孟共晶合金及偏晶反应的比较
Equilibrium Comparision
金属塑性 Plastic Deformation
滑动面 Slip Plan
畸变 Distortion
硬化 Work Hardening
退火 Annealing
回复柔软 Crystal Recovery
再结晶 Recrystallization
金属材料的性能及试验 Properties testing of metal
化学性能 Chemical Properties
物理性能 Physical Properties
颜色 Colour
磁性 Magnetisum
比电阻 Specific resistivity specific resistance
比重 Specific gravity specific density
比热 Specific Heat
热膨胀系数 Coefficient of thermal expansion
导热度
Heat conductivity

机械性能 Mechanical properties
屈服强度(降伏强度) (Yield strangth)
弹性限度、阳氏弹性系数及屈服点
elastic limit, Yeung's module of elasticity to yield point
伸长度 Elongation
断面缩率 Reduction of area
金属材料的试验方法
The Method of Metal inspection
不破坏检验 Non – destructive inspections
渗透探伤法 Penetrate inspection
磁粉探伤法 Magnetic particle inspection
放射线探伤法 Radiographic inspection
超声波探伤法 Ultrasonic inspection
显微观察法 Microscopic inspection
破坏的检验 Destructive Inspection
冲击测试 Impact Test
疲劳测试 Fatigue Test
潜变测试 Creep Test
潜变强度 Creeps Strength
第壹潜变期 Primary Creep
第二潜变期 Secondary Creep
第三潜变期 Tertiary Creep
主要金属元素之物理性质 Physical properties of major Metal Elements
工业标准及规格 – 铁及非铁金属 Industrial Standard – Ferrous Non – ferrous Metal
磁力 Magnetic
简介 General
软磁 Soft Magnetic
硬磁 Hard Magnetic
磁场 Magnetic Field
磁性感应 Magnetic Induction
透磁度 Magnetic Permeability
磁化率 Magnetic Susceptibility (Xm)
磁力(Magnetic Force)及磁场(Magnetic Field)是因物料里的电子(Electron)活动而产生
抗磁体、顺磁体、铁磁体、反铁磁体及亚铁磁体
Diamagnetism, Paramagnetic, Ferromagnetism,Antiferromagnetism Ferrimagnetism
抗磁体 Diamagnetism
磁偶极子 Dipole
负磁力效应 Negative effect
顺磁体 Paramagnetic
正磁化率 Positive magnetic susceptibility
铁磁体 Ferromagnetism
转变元素 Transition element
交换能量 Positive energy exchange
外价电子 Outer valence electrons

化学结合 Chemical bond
自发上磁 Spontaneous magnetization
磁畴 Magnetic domain
相反旋转 Opposite span
比较抗磁体、顺磁体及铁磁体 Comparison of Diamagnetism, Paramagnetic Ferromagnetism
反铁磁体 Antiferromagnetism
亚铁磁体 Ferrimagnetism
磁矩 magnetic moment
净磁矩 Net magnetic moment
钢铁的主要成份 The major element of steel
钢铁用"碳"之含量来分类 Classification of Steel according to Carbon contents
铁相 Steel Phases
钢铁的名称 Name of steel
纯铁体 Ferrite
渗碳体 Cementitle
奥氏体 Austenite
珠光体及共释钢 Pearlite Eutectoid
奥氏体碳钢 Austenite Carbon Steel
单相金属 Single Phase Metal
共释变态 Eutectoid Transformation
珠光体 Pearlite
亚铁释体 Hyppo-Eutectoid
初释纯铁体 Pro-entectoid ferrite
过共释钢 Hype-eutectoid
珠光体 Pearlite
粗珠光体 Coarse pearlite
中珠光体 Medium pearlite
幼珠光体 Fine pearlite
磁性变态点 Magnetic Transformation
钢铁的制造 Manufacturing of Steel
连续铸造法 Continuous casting process
电炉 Electric furnace
均热炉 Soaking pit
全静钢 Killed steel
半静钢 Semi-killed steel
沸腾钢(未净钢) Rimmed steel
钢铁生产流程 Steel Production Flow Chart
钢材的熔铸、锻造、挤压及延轧 The Casting, Fogging, Extrusion, Rolling Steel
熔铸 Casting
锻造 Fogging
挤压 Extrusion
延轧 Rolling
冲剪 Drawing stamping
特殊钢 Special Steel

简介 General
特殊钢以原素分类 Classification of Special Steel according to Element
特殊钢以用途来分类 Classification of Special Steel according to End Usage
易车(快削)不锈钢 Free Cutting Stainless Steel
含铅易车钢 Leaded Free Cutting Steel
含硫易车钢 Sulphuric Free Cutting Steel
硬化性能 Hardenability
钢的脆性 Brittleness of Steel
低温脆性 Cold brittleness
回火脆性 Temper brittleness
日工标准下的特殊钢材 Specail Steel according to JIS Standard
铬钢 – 日工标准 JIS G4104 Chrome steel to JIS G4104
铬钼钢钢材 – 日工标准 G4105 62 Chrome Molybdenum steel to JIS G4105
镍铬 – 日工标准 G4102 63 Chrome Nickel steel to JIS G4102
镍铬钼钢 – 日工标准 G4103 64 Nickel, Chrome Molybdenum Steel to JIS G4103
高锰钢铸 – 日工标准 High manganese steel to JIS standard
片及板材 Chapter Four-Strip, Steel Plate
冷辘低碳钢片(双单光片)(日工标准 JIS G3141) 73 - 95
Cold Rolled (Low carbon) Steel Strip (to JIS G 3141)
简介 General
美材试标准的冷辘低碳钢片
Cold Rolled Steel Strip American Standard – American Society for testing and materials (ASTM)
日工标准 JIS G3141 冷辘低碳钢片(双单光片)的编号浅释
Decoding of cold rolled(Low carbon)steel strip JIS G3141
材料的加工性能 Drawing abillity
硬度 Hardness
表面处理 Surface finish
冷辘钢捆片及张片制作流程图表 Production flow chart cold rolled steel coil sheet
冷辘钢捆片及张片的电镀和印刷方法
Cold rolled steel coil sheet electro-plating & painting method
冷辘(低碳)钢片的分类用、途、工业标准、品质、加热状态及硬度表
End usages, industrial standard, quality, condition and hardness of cold rolled steel strip
硬度及拉力 Hardness Tensile strength test
拉伸测试(顺纹测试) Elongation test
杯突测试(厚度: 0.4 公厘至 1.6 公厘，准确至 0.1 公厘 3 个试片平均数)
Erichsen test (Thickness: 0.4mm to 1.6mm, figure round up to 0.1mm)
曲面(假曲率) Camber
厚度及阔度公差 Tolerance on Thickness Width
平坦度(阔度大于 500 公厘，标准回火) Flatness (width>500mm, temper: standard)
弯度 Camber
冷辘钢片储存与处理提示
General advice on handling storage of cold rolled steel coil & sheet
防止生锈 Rust Protection
生锈速度表 Speed of rusting

焊接 Welding
气焊 Gas Welding
埋弧焊 Submerged-arc Welding
电阻焊 Resistance Welding
冷辘钢片(拉力: 30-32 公斤/平方米)在没有表面处理状态下的焊接状况
Spot welding conditions for bared (free from paint, oxides etc) Cold rolled mild steel sheets(T/S:30-32 Kgf/ μ m2)
时间效应(老化)及拉伸应变 Aging Stretcher Strains
日工标准(JIS G3141)冷辘钢片化学成份
Chemical composition – cold rolled steel sheet to JIS G3141
冷辘钢片的"理论重量"计算方程式 Cold Rolled Steel Sheet – Theoretical mass
日工标准(JIS G3141)冷辘钢片重量列表 Mass of Cold-Rolled Steel Sheet to JIS G3141
冷辘钢片订货需知 Ordering of cold rolled steel strip/sheet
其它日工标准冷轧钢片(用途及编号)
JIS standard application of other cold Rolled Special Steel
电镀锌钢片或电解钢片
Electro-galvanized Steel Sheet/Electrolytic Zinc Coated Steel Sheet
电解/电镀锌大大增强钢片的防锈能力
Galvanic Action improving Weather Corrosion Resistance of the Base Steel Sheet
上漆能力 Paint Adhesion
电镀锌钢片的焊接 Welding of Electro-galvanized steel sheet
点焊 Spot welding
滚焊 Seam welding
电镀锌(电解)钢片 Electro-galvanized Steel Sheet
生产流程 Production Flow Chart
常用的镀锌钢片(电解片)的基层金属、用途、日工标准、美材标准及一般厚度
Base metal, application, JIS ASTM standard, and Normal thickness of galvanized steel sheet
锌镀层质量 Zinc Coating Mass
表面处理 Surface Treatment
冷轧钢片 Cold-Rolled Steel Sheet/Strip
热轧钢片 Hot-Rolled Sheet/Strip
电解冷轧钢片厚度公差
Thickness Tolerance of Electrolytic Cold-rolled sheet
热轧钢片厚度公差
Thickness Tolerance of Hot-rolled sheet
冷轧或热轧钢片阔度公差
Width Tolerance of Cold or Hot-rolled sheet
长度公差 Length Tolerance
理论质量 Theoretical Mass
锌镀层质量(两个相同锌镀层厚度)
Mass Calculation of coating (For equal coating)/MM
锌镀层质量(两个不同锌镀层厚度)
Mass Calculation of coating (For differential coating)/MM
镀锡薄铁片(白铁皮/马口铁) (日工标准 JIS G3303)

镀锡薄铁片的构造 Construction of Electrolytic Tinplate
镀锡薄钢片(白铁皮/马日铁)制造过程 Production Process of Electrolytic Tinplate
锡层质量 Mass of Tin Coating (JIS G3303-1987)
两面均等锡层 Both Side Equally Coated Mass
两面不均等锡层 Both Side Different Thickness Coated Mass
级别、电镀方法、镀层质量及常用称号
Grade, Plating type, Designation of Coating Mass Common Coating Mass
镀层质量标记 Markings Designations of Differential Coatings
硬度 Hardness
单相轧压镀锡薄铁片(白铁皮/马口铁) Single-Reduced Tinplate
双相辗压镀锡薄钢片(马口铁/白铁皮) Dual-Reduction Tinplate
钢的种类 Type of Steel
表面处理 Surface Finish
常用尺寸 Commonly Used Size
电器用硅 [硅] 钢片 Electrical Steel Sheet
软磁材料 Soft Magnetic Material
滞后回线 Narrow Hystersis
矫顽磁力 Coercive Force
硬磁材料 Hard Magnetic Material
最大能量积 Maximum Energy Product
硅含量对电器用的低碳钢片的最大好处 The Advantage of Using Silicon low Carbon Steel
晶粒取向(Grain-Oriented)及非晶粒取向(Non-Oriented)
Grain Oriented Non-Oriented
电器用硅 [硅] 钢片的最终用途及规格
End Usage and Designations of Electrical Steel Strip
电器用的硅 [硅] 钢片之分类
Classification of Silicon Steel Sheet for Electrical Use
电器用钢片的绝缘涂层
Performance of Surface Insulation of Electrical Steel Sheets
晶粒取向电器用硅钢片主要工业标准
International Standard – Grain-Oriented Electrical Steel Silicon Steel Sheet for Electrical Use
晶粒取向电器用硅钢片 Grain-Oriented Electrical Steel
晶粒取向，定取向芯钢片及高硼定取向芯钢片之磁力性能及夹层系数(日工标准及美材标准)
Magnetic Properties and Lamination Factor of SI-ORIENT-CORE SI-ORIENT-CORE-HI B
Electrical Steel Strip (JIS and AISI Standard)
退火 Annealing
电器用钢片用家需自行应力退火原因 Annealing of the Electrical Steel Sheet
退火时注意事项 Annealing Precautionary
碳污染 Prevent Carbon Contamination
热力应先从工件边缘透入 Heat from the Laminated Stacks Edges
提防过份氧化 No Excessive Oxidation
应力退火温度 Stress –relieving Annealing Temperature
晶粒取向电器用硅 [硅] 钢片 – 高硼(HI-B)定取向芯钢片及定取向芯钢片之机械性能及夹层系数

Mechanical Properties and Lamination Factors of SI-ORIENT-CORE-HI-B and SI-ORIENT-CORE Grain Orient Electrical Steel Sheets

晶粒取向电器用硅 [硅] 钢;片 - 高硼低硫(LS)定取向 钢片之磁力及电力性能

Magnetic and Electrical Properties of SI-ORIENT-CORE-HI-B-LS

晶粒取向电器用硅 [硅] 钢片 - 高硼低硫(LS) 定取向钢片之机械性能及夹层系数

Mechanical Properties and Lamination Factors of SI-ORIENT-CORE-HI-B-LS

晶粒取向电器用硅(硅)钢片-高硼(HI-B)定取向 芯钢片，定取向芯钢片及高硼低硫(LS)定取向芯钢片之厚度及阔度公差

Physical Tolerance of SI-ORIENT-CORE-HI-B, SI-ORIENT-CORE, & SI-CORE-HI-B-LS Grain Oriented Electrical Steel Sheets

晶粒取向电器用硅(硅)钢片 - 高硼(HI-B)定取向 芯钢片，定取向芯钢片及高硼低硫(LS)定取向芯钢片之标准尺寸及包装

Standard Forms and Size of SI-ORIENT-CORE-HI-B,SI-CORE, & SI-ORIENT-CORE-HI-B-LS Grain-

Oriented Electrical Steel Sheets

绝缘表面 Surface Insulation

非晶粒取向电力用钢片的电力、磁力、机械性能 及夹层系数

Lamination Factors of Electrical, Magnetic & Mechanical Non-Grain Oriented Electrical

电器及家电外壳用镀层冷辘 [低碳] 钢片

Coated (Low Carbon) Steel Sheets for Casing,Electricals & Home Appliances

镀铝硅钢片 Aluminized Silicon Alloy Steel Sheet

镀铝硅合金钢片的特色

Feature of Aluminized Silicon Alloy Steel Sheet

用途 End Usages

抗化学品能力

Chemical Resistance

镀铝(硅)钢片 - 日工标准(JIS G3314)

Hot-aluminum-coated sheets and coils to JIS G 3314

镀铝(硅)钢片 - 美材试标准(ASTM A-463-77)35.7 JIS G3314 镀热浸铝片的机械性能

Mechanical Properties of JIS G 3314 Hot-Dip Aluminum-coated Sheets and Coils

公差 Size Tolerance

镀铝(硅)钢片及其它种类钢片的抗腐蚀性能比较

Comparsion of various resistance of aluminized steel & other kinds of steel

镀铝(硅)钢片生产流程

Aluminum Steel Sheet, Production Flow Chart

焊接能力 Weldability

镀铝钢片的焊接状态(比较冷辘钢片)

Tips on welding of Aluminized sheet in comparasion with cold rolled steel strip

钢板 Steel Plate

钢板用途分类及各国钢板的工业标准包括日工标准及美材试标准

Type of steel Plate & Related JIS, ASTM and Other Major Industrial Standards

钢板生产流程 Production Flow Chart

钢板订货需知 Ordering of Steel Plate

不锈钢 Stainless Steel

不锈钢的定义 Definition of Stainless Steel
不锈钢之分类，耐腐蚀性及耐热性
Classification, Corrosion Resistant & Heat Resistance of Stainless Steel
铁铬系不锈钢片 Chrome Stainless Steel
马氏体不锈钢 Martensite Stainless Steel
低碳马氏体不锈钢 Low Carbon Martensite Stainless Steel
含铁体不锈钢 Ferrite Stainless Steel
镍铬系不锈钢 Nickel Chrome Stainless Steel
释出硬化不锈钢 Precipitation Hardening Stainless Steel
铁锰铝不锈钢 Fe / Mn / Al / Stainless Steel
不锈钢的磁性 Magnetic Property & Stainless Steel
不锈钢箔、卷片、片及板之厚度分类 Classification of Foil, Strip, Sheet & Plate by Thickness
表面保护胶纸 Surface protection film
不锈钢片材常用代号 Designation of SUS Steel Special Use Stainless
表面处理 Surface finish
薄卷片及薄片(0.3 至 2.9mm 厚之片)机械性能
Mechanical Properties of Thin Stainless Steel(Thickness from 0.3mm to 2.9mm) – strip/sheet
不锈钢片机械性能(301, 304, 631, CSP)
Mechanical Properties of Spring use Stainless Steel
不锈钢 – 种类，工业标准，化学成份，特点及 主要用途
Stainless Steel – Type, Industrial Standard, Chemical Composition, Characteristic & end usage of the most commonly used Stainless Steel
不锈钢薄片用途例 End Usage of Thinner Gauge
不锈钢片、板用途例 Examples of End Usages of Strip, Sheet & Plate
不锈钢应力退火卷片常用规格名词图解
General Specification of Tension Annealed Stainless Steel Strips
耐热不锈钢 Heat-Resistance Stainless Steel
镍铬系耐热不锈钢特性、化学成份、及操作温度 Heat-Resistance Stainless Steel
铬系耐热钢 Chrome Heat Resistance Steel
镍铬耐热钢 Ni - Cr Heat Resistance Steel
超耐热钢 Special Heat Resistance Steel
抗热超级合金 Heat Resistance Super Alloy
耐热不锈钢比重表
Specific Gravity of Heat – resistance steel plates and sheets stainless steel
不锈钢材及耐热钢材标准对照表 Stainless and Heat-Resisting Steels
发条片 Power Spring Strip
发条的分类及材料 Power Spring Strip Classification and Materials
上链发条 Wind-up Spring
倒后擦发条 Pull Back Power Spring
圆面("卜竹")发条 Convex Spring Strip
拉尺发条 Measure Tape
魔术手环 Magic Tape
魔术手环尺寸图 Drawing of Magic Tap
定型发条 Constant Torque Spring

定型发条及上炼发条的驱动力 Spring Force of Constant Torque Spring and Wing-up Spring
定型发条的形状及翻动过程 Shape and Spring Back of Constant Torque Spring
定型发条驱动力公式及代号 The Formula and Symbol of Constant Torque Spring
边缘处理 Edge Finish
硬度 Hardness
高碳钢化学成份及用途 High Carbon Tool Steel, Chemical Composition and Usage
每公斤发条的长度简易公式 The Length of 1 Kg of Spring Steel Strip
SK-5 & AISI-301 每公斤长的重量/公斤(阔 100-200 公厘) Weight per one meter long (kg) (Width 100-200mm)
SK-5 & AISI-301 每公斤之长度(阔 100-200 公厘) Length per one kg (Width 100-200mm)
SK-5 & AISI-301 每公尺长的重量/公斤(阔 2.0-10 公厘) Weight per one meter long (kg) (Width 2.0-10mm)
SK-5 & AISI-301 每公斤之长度(阔 2.0-10 公厘) Length per one kg (Width 2.0-10mm)
高碳钢片 High Carbon Steel Strip
分类 Classification
用组织结构分类 Classification According to Grain Structure
用含碳量分类 – 即低碳钢、中碳钢及高碳钢 Classification According to Carbon Contains
弹簧用碳钢片 CarbonSteel Strip For Spring Use
冷轧状态 Cold Rolled Strip
回火状态 Annealed Strip
淬火及回火状态 Hardened & Tempered Strip/ Precision – Quenched Steel Strip
贝氏体钢片 Bainite Steel Strip
弹簧用碳钢片材之边缘处理 Edge Finished
淬火剂 Quenching Media
碳钢回火 Tempering
回火有低温回火及高温回火 Low & High Temperature Tempering
高温回火 High Temperature Tempering
退火 Annealing
完全退火 Full Annealing
扩散退火 Diffusion Annealing
低温退火 Low Temperature Annealing
中途退火 Process Annealing
球化退火 Spheroidizing Annealing
光辉退火 Bright Annealing
淬火 Quenching
时间淬火 Time Quenching
奥氏铁盪回火 Austempering
马氏铁体淬火 Marquenching
高碳钢片用途 End Usage of High Carbon Steel Strip
冷轧高碳钢 – 日本工业标准 Cold-Rolled (Special Steel) Carbon Steel Strip to JIS G3311
电镀金属钢片 Plate Metal Strip
电镀金属捆片的优点 Advantage of Using Plate Metal Strip
金属捆片电镀层 Plated Layer of Plated Metal Strip

镀镍 Nickel Plated
镀铬 Chrome Plated
镀黄铜 Brass Plated
基层金属 Base Metal of Plated Metal Strip
低碳钢或铁基层金属 Iron & Low Carbon as Base Metal
不锈钢基层金属 Stainless Steel as Base Metal
铜基层金属 Copper as Base Metal
黄铜基层金属 Brass as Base Metal
轴承合金 Bearing Alloy
轴承合金 - 日工标准 JIS H 5401 Bearing Alloy to JIS H 5401
锡基、铅基及锌基轴承合金比较表
Comparison of Tin base, Lead base and Zinc base alloy for Bearing purpose
易溶合金 Fusible Alloy
焊接合金 Soldering and Brazing Alloy
软焊 Soldering Alloy
软焊合金 - 日本标准 JIS H 4341 Soldering Alloy to JIS H 4341
硬焊 Brazing Alloy
Other Soldering Material 细线材、枝材、棒材
Chapter Five Wire, Rod & Bar 线材/枝材材质分类及制成品
Classification and End Products of Wire/Rod 铁线(低碳钢线)日工标准 JIS G 3532
Low Carbon Steel Wires (Iron Wire) to JIS G 3532
光线(低碳钢线)，火线(退火低碳钢线)，铅水线 (镀锌低碳钢线)及制造钉用低碳钢线之代号、公差及备注
Ordinary Low Carbon Steel Wire, Annealed Low Carbon Steel Wire, Galvanized low Carbon Steel Wire & Low Carbon Steel Wire for nail manufacturing - classification, Symbol of Grade, Tolerance and Remarks.
机械性能 Mechanical Properites
锌包层之重量，铜硫酸盐试验之酸洗次数及测试用卷筒直径
Weight of Zinc-Coating, Number of Dippings in Cupric Sulphate Test and Diameters of Mandrel Used for Coiling Test
冷冲及冷锻用碳钢线枝
Carbon Steel Wire Rods for Cold Heading & Cold Forging (to JIS G3507)
级别，代号及化学成份
Classification, Symbol of Grade and Chemical Composition
直径公差，偏圆度及脱碳层的平均深度
Diameter Tolerance, Ovality and Average Decarburized Layer Depth
冷拉钢枝材 Cold Drawn Carbon Steel Shafting Bar
枝材之美工标准，日工标准，用途及化学成份
AISI, JIS End Usage and Chemical Composition of Cold Drawn Carbon Steel Shafting Bar
冷拉钢板重量表 Cold Drawn Steel Bar Weight Table
高碳钢线枝 High Carbon Steel Wire Rod (to JIS G3506)
冷拉高碳钢线 Hard Drawn High Carbon Steel Wire(to JIS G3521, ISO-84580-1&2)
化学成份分析表 Chemical Analysis of Wire Rod
线径、公差及机械性能(日本工业标准 G 3521) Mechanical Properties (JIS G 3521)

琴线(日本标准 G3522) Piano Wires (to G3522)
级别，代号，扭曲特性及可用之线材直径
Classes, symbols, twisting characteristic and applied Wire Diameters
直径，公差及拉力强度 Diameter, Tolerance and Tensile Strength
裂纹之容许深度及脱碳层 Permissible depth of flaw and decarburized layer
常用的弹簧不锈钢线-编号，特性，表面处理及化学成份
StainlessSpring Wire – National Standard number, Charateristic, Surface finish & Chemical composition
弹簧不锈钢线，线径及拉力列表
Stainless Spring Steel, Wire diameter and Tensile strength of Spring Wire
处理及表面状况 Finish & Surface
各种不锈钢线在不同处理拉力比较表
Tensile Strength of various kinds of Stainless Steel Wire under Different Finish
圆径及偏圆度之公差 Tolerance of Wire Diameters & Ovality
铬镍不锈钢及抗热钢弹簧线材 - 美国材验学会 ASTM A313 - 1987
Chromium – Nickel Stainless and Heat-resisting Steel Spring Wire – ASTM A313 – 1987
化学成份 Chemical Composition
机械性能 Mechanical Properties
305, 316, 321 及 347 之拉力表
Tensile Strength Requirements for Types 305, 316, 321 and 347
A1S1-302 贰级线材之拉力表 Tensile Strength of A1S1-302 Wire
日本工业标准 - 不锈钢的化学成份(先数字后字母排列)
JIS – Chemical Composition of Stainless Steel (in order of number & alphabet)
美国工业标准 - 不锈钢及防热钢材的化学成份(先数字后字母排列)
AISI – Chemical Composition of Stainless Steel & Heat-Resistant Steel(in order of number & alphabet)
易车碳钢 Free Cutting Carbon Steels (to JIS G4804)
化学成份 Chemical composition
圆钢枝，方钢枝及六角钢枝之形状及尺寸之公差
Tolerance on Shape and Dimensions for Round Steel Bar, Square Steel Bar, Hexagonal Steel Bar
易车(快削)不锈钢 Free Cutting Stainless Steel
易车(快削)不锈钢种类 Type of steel
易车(快削)不锈钢拉力表 Tensile Strength of Free Cutting Wires
枝/棒无芯磨公差表 (μ) (μ = 1/100 mm) Rod/Bar Centreless Grind Tolerance
易车不锈钢及易车钢之不同尺寸及硬度比较
Hardness of Different Types & Size of Free Cutting Steel
扁线、半圆线及异形线 Flat Wire, Half Round Wire,
加工方法 Manufacturing Method
应用材料 Material Used
特点 Characteristic
用途 End Usages
不锈钢扁线及半圆线常用材料
Commonly used materials for Stainless Flat Wire & Half Round Wire
扁线公差 Flat Wire Tolerance

方线公差　　Square Wire Toleranc