

# CARBON STEEL

## PRICE BOOK



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# General Information

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## INTRODUCTION

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This AK Steel Corporation Price Book contains our official published price list for Carbon Flat Rolled Products. Product information is true and, to the best of our knowledge, exact, but may not define the complete range (gauge, size, etc.) of products we manufacture. For specific product availability, please contact our Customer Service Center at 844.783.3599.

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## PRICE BUILDUP

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Price base refers to the base product as described in each product section. All extras are in dollars per 100 pounds and are to be added to the price base. Each extra is separate and distinct and does not include or absorb any other extra (unless specifically stated). Extras will extend only through the second decimal, which will be increased \$0.01 when the third decimal is \$0.005 or more. Freight charges will be based upon actual scale weight or minimum load quantity, unless otherwise agreed. All prices listed are F.O.B. from our mill.

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## GENERAL CONDITIONS

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Our price bases and extras are based upon our standard method of production. If other methods of manufacture are required, additional extras, not listed herein, may apply. Price bases and extras are subject to change without notice. Unless otherwise negotiated, billings will reflect prices in effect at time of shipment. Our specific conditions of sale are detailed on all official sales correspondence such as quotations, contracts and order acknowledgements.

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## WARRANTY STATEMENT

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The information and data presented in this Price Book are typical of average values and not a guarantee of maximum, minimum or actual values. Materials specifically suggested for applications described herein are made solely for the purpose of illustration to enable the reader to make their own evaluation. While the information is believed to be technically correct, **AK Steel disclaims all warranties, expressed or implied, including but not limited to, any warranty as to its suitability for any general or particular use. AK Steel will not be liable for any damages of any kind arising out of or relating to the use of or the inability to use the information provided, including but not limited to, ordinary, special, incidental, exemplary or consequential damages, whether based upon contract, tort or any other legal theory, whether foreseeable or not, and even if AK Steel has been advised of the possibility of the damages.**

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## TRADEMARK/COPYRIGHT

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AK STEEL®, the AK Steel Logo and the other marks shown below carrying the ® designation are all registered trademarks of the AK Steel Corporation and registered with the U.S. Patent and Trademark Office. The other trademarks listed below are also owned by AK Steel. None of the AK Steel trademarks may be used without AK Steel's prior written permission.

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13-4 SR®	FORMTUBE®	11 Cr-Cb™
15 Cr-Cb®	GREYSTONE®	18 Cr-Cb™
15-5 PH®	ILUMIBRITE®	311 DQ™
17-4 PH®	LITE CARLITE®	17-14 Cu Mo™
17-7 PH®	NEXMET®	1 SR™
18 SR®	NEXTUBE®	2 SR™
AK & Design®	NITRONIC®	6 SR™
AK COATINGS®	PAINTGRIP®	12 SR™
AK STEEL® (Block Letters)	PH 15-7 Mo®	18-9 LW™
AK STEEL® & Design	POLYGLIDE®	AK-SPECTRA™
AK STEEL® & Design (Two Line Version)	STONE MATTE®	ANTI-STICK™
AK TUBE®	T2®	BORON STEEL™
ALUMI-THERM®	THERMAK®	CEM™
AQUAMET®	TRAN-COR®	EXTRASMOOTH™
ARMCO®	ULTRA FORM®	FORMABLE™
ARMCO® & Design	ULTRA HONE®	HCR™
CARLITE®	ULTRALUME®	HIGH PERFORMANCE-10™
CHROMESHIELD®	ULTRASMOOTH®	OPTIMET™
DI-MAX®	UNIGRAIN®	ORIENTED LS™
DR®	UNIVIT®	ULTRACHEM™
ELECTRASMOOTH®	VIT-PLUS®	
	ZINCGRIP®	

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## CONDITIONS OF SALE

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All orders are subject to AK Steel Corporation Conditions of Sale found on the AK Steel website.



# General Product Information

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## **STEEL QUALITY DEFINITIONS – HOT ROLLED, COLD ROLLED, ELECTROGALVANIZED, AND ENAMELING STEEL**

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### **ASTM Specifications**

All products are manufactured to current ASTM specifications. These standards have been revised to reflect steel quality designations adding chemical compositions and typical mechanical properties.

### **Commercial Steel (CS Type A, B, or C)**

This quality is defined in ASTM Standards A1008 for Cold Rolled, A1011 and A1018 for Hot Rolled and is equivalent to the former Commercial Quality. Sheets of this quality are suitable for applications where bending, moderate forming or drawing may be involved. Chemistry limits for CS Type B preclude the application of ultralow carbon material of this quality.

CS Type B is not recommended where a high degree of uniformity in mechanical properties is required.

To prevent the occurrence of fluting or stretcher strain in forming or drawing, Cold Rolled Sheets are temper rolled, however, the effect of temper rolling is only temporary due to the phenomenon commonly known as aging. Effective roller leveling immediately prior to fabrication will minimize the tendency to flute or strain. Stocking of material for an extended period of time should be avoided. To eliminate the possibility of aging, killed steel can be supplied but must be specified.

### **Drawing Steel Type B (DS Type B)**

This quality is defined in ASTM A1008 for Cold Rolled and A1011 and A1018 for Hot Rolled and is equivalent to the former DQSK. This quality has improved mechanical properties compared to CS and should be specified for fabrication of parts having stringent drawing requirements. Chemistry limits forbid application of ultralow carbon material to this quality. In addition to the improved formability, DS Type B is non-aging after it has been properly temper rolled.

### **Extra Deep Drawing Steel (EDDS)**

Steel of this quality is defined in ASTM Standard A1008. Sheets of this quality should be specified when DS Type B will not provide a sufficient degree of ductility and drawability for the fabrication of parts having stringent drawing requirements. This quality is furnished as a vacuum degassed stabilized steel. It is non-aging and will not exhibit stretcher strain or fluting.

### **Extra Deep Drawing Steel Plus (EDDS+)**

Sheets of this quality should be specified for the most difficult parts having the most stringent drawing requirements. This quality is furnished as a vacuum degassed stabilized steel. It is non-aging and will not exhibit stretcher strain or fluting.

**Structural Steel (SS)**

Steel of this quality is defined in ASTM Standards A1011 and A1018 for Hot Rolled and ASTM A1008 for Cold Rolled and is equivalent to the former Structural Quality. These products are produced to specified mechanical properties. The properties are obtained through control of carbon and manganese.

**High Strength Low Alloy Steel (HSLAS)  
High Strength Low Alloy Steel with Improved Formability (HSLAS-F)**

Steel of this quality is defined in ASTM Standards A1011 and A1018 for Hot Rolled and ASTM A1008 for Cold Rolled and is equivalent to the former High Strength Low Alloy Steel. These products are produced to specified mechanical properties by additions of microalloying agents.

**Specified Hardness**

For some applications, customers chose to specify a minimum, maximum or a range of Rockwell hardness (minimum of 15 pt. range). When ordering this quality, chemistry cannot be specified. All ranges may not be available.

**Specified Mechanical Properties**

Applications that require specific mechanical properties that are not covered by Industry/Society standards, or customer specification, agreed upon mechanical properties will be met.

**Bake Hardenable**

Steel of this quality is specified when a customer requires a steel that increases in strength from blank to finished part, through a combination of work hardening during part forming and strain aging during subsequent thermal processing.

**Dent Resistant**

Steel of this quality are conventionally low carbon or ultralow carbon that are alloyed and processed to allow increase of their strength level during the formation of the part through work hardening.

**Enamel Steel**

Defined in ASTM A424. Type I, Type II and Type III are available.

**Full Hard Steel**

Material ordered as Full Hard will be produced using the chemical requirements of Commercial Steel Type B found in ASTM A1008 with a minimum Rockwell of B84 unless otherwise requested. Full Hard is also available to a variety of chemical specifications which must be specifically outlined at the time of purchase. Full Hard for conversion to specific finished products is also available upon request. Review end use and specifications with your AK Steel Representative.

**Press Hardenable Steel (PHS)**

Steel of this quality is commonly referenced as Mn22B5 or 15B22 and is available as Hot Rolled, Cold Rolled Full Hard, Cold Rolled Annealed and Tempered, and Aluminized.

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## STEEL QUALITY DEFINITIONS – HOT DIP COATED

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### **ASTM Specifications**

All products are manufactured to current ASTM specifications. These products (ZINCGRIP, Aluminized Type 1, and Aluminized Type 2) are produced in quality designations defined in the appropriate ASTM standards. These standards are:

ASTM A653 - ZINCGRIP Steel

ASTM A463 - Aluminized Steel Type 1 and Type 2

These standards have been revised to redefine steel quality designations adding chemical compositions and typical mechanical properties. Not all quality designations are available in every product.

### **Commercial Steel (CS) (Type A, B, or C)**

Sheets of this quality are equivalent to the former Commercial Quality and are suitable for the same types of applications. ZINCGRIP and Aluminized are subject to strain and fluting unless supplied as an extra smooth or temper rolled product; however, Commercial Steel may also exhibit the phenomenon of aging. There are three types of Commercial Steels defined in the ASTM standard each one having specific chemistry and typical mechanical property ranges. See individual AK Steel products for available types.

### **Forming Steel (Type A and B)**

Sheets of this quality are intended for applications where moderate forming is desired which may not be achieved by typical commercial steel. There are two types, A and B, defined in ASTM standards with a specific chemistry and non-mandatory mechanical properties.

### **Deep Drawing Steel (DDS)**

Sheets of this quality are equivalent to the former Drawing Quality Special Killed. This grade may be produced from either low carbon aluminum killed steel or interstitial free stabilized steel at the producers option. Objections to the use of stabilized steel must be included in customer order requirements.

### **Extra Deep Drawing Steel (EDDS)**

Sheets of this quality provide a degree of ductility and drawability for the fabrication of parts having stringent drawing requirements. The grade requires use of interstitial free, stabilized steel.

### **Extra Deep Drawing Steel Plus (EDDS+)**

Sheets of this quality should be specified for the most difficult parts having stringent drawing requirements. This grade requires the use of interstitial free, stabilized steel.

### **Structural Steel (SS)**

These products are produced to specified mechanical property ranges as designated in the ASTM standard. The properties are obtained through control of carbon and manganese and other elements.

### **High Strength Low Alloy Steel (HSLAS) High Strength Low Alloy Steel with Improved Formability (HSLAS-F)**

The products are produced to specified mechanical property ranges in the ASTM standard through the additions of microalloying elements.

### **Specified Mechanical Properties**

Applications that require specific mechanical properties that are not covered by Industry/Society standards, or customer specification, agreed upon mechanical properties will be met.



**Specified Hardness**

For some applications, customers chose to specify a minimum, maximum or a range of Rockwell hardness (minimum of 15 pt range). When ordering this quality, chemistry cannot be specified. All ranges might not be available.

**Bake Hardenable**

Steel of this quality is specified when a customer requires a steel that increases in strength from blank to finished part, through a combination of work hardening during part forming and strain aging during subsequent thermal processing.

**Dent Resistant**

Steel of this quality are conventionally low carbon or ultralow carbon that are alloyed and processed to allow increase of their strength level during the formation of the part through work hardening.

**Dual Phase (DP)**

These products provide high strengths with improved ductility through a combination of chemistry and precise processing parameters to produce a microstructure with a matrix of soft phase (ferrite) and hard phase (martensite). The term 'Dual Phase' represents the ferrite and martensite phases present. This type of steel comes in a variety of strength levels. The material also exhibits a bake hardening effect.

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**TEST REPORTING**

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Test data can be supplied by a number of different means.

Standard ladle analysis is the chemical analysis of a heat of steel and is supplied on the corresponding AK Steel Load Tally and Shipping Tag for each shipped coil.

Test Reports/Certifications can be supplied when reporting test data for specification compliance. Standard test reports can include mechanical properties, ladle chemistry, and coating weight data. This data can be supplied in either English or metric units utilizing ASTM, JIS or DIN test methods.

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## CLAIM POLICIES

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### General

The purpose of our claim policy is to support our customer's manufacturing performance. This requires thoughtful cooperation in settling claims. Steel determined to be unusable because of mill related reasons should be set aside for review with the appropriate AK Steel personnel. This includes blanks, cut lengths, coils or slit mults from coils. When an individual coil or slit mult contains an apparent high frequency of mill imperfections, it should be set aside only after a minimum of 10% of the coil has been processed.

Material tested and certified to meet an agreed upon specification for mechanical or physical properties is done under guidelines outlined by ASTM, JIS or DIN testing requirements. Material and testing variations may result in disputes over material conformance. In such cases, samples from the area of suspected non-conformance must be secured for AK Steel to verify compliance. Also of note, material is to be tested in the quarter position of the width in the manner prescribed by the specification or determined by the producing mill if no such specification requirement exists.

The customer can expect 98% satisfactory product in coil shipments of Carbon Sheet Steel products and 97% satisfactory product in coil shipments of High Strength Sheet products. If, because of coil ends or mill related imperfections, these standards are not met, a claim for the value of the material will be honored after review by appropriate AK Steel personnel.

**Exception:** The Hot Rolled base product is, by definition, shipped without further processing, therefore, the customer must accept without claim, a maximum of 30 ft. on either end of a coil that exceeds gauge or width tolerances.

Some customers statistically evaluate production line performance, e.g. breakage and line scrap. When negotiated prior to order acceptance, AK Steel will recognize fair and reasonable line performance standards such as SAE J424 - "Method for Determining Breakage Allowance for Sheet Steel."

### Coil Breaks

These guidelines reference breaks across the width of the coil caused by discontinuous yielding of the strip as it processes.

Any processing that recoils on ID diameters less than 24 in. are not covered by these guidelines.

#### HR

- HR Bands off of the Hot Strip Mill are subject to coil breaks upon recoiling (regardless of grade applied).
- Coil break-free HR requires Temper Rolling (purchase order must designate "coil breaks objectionable").

#### CR/EG/Enameling Steels

- Properly processed EDDS/EDDS+ (I-F steel) is not subject to coil breaks in an as-received condition or during subsequent processing.
- Because of equipment configuration and geometry there is a potential for coil breaks on material over 0.060 in. (1.5 mm) thickness on CS-B and DS Type B and UNIVIT in the as-received condition.

## ZG/GA/AL

- Properly processed EDDS and EDDS+ (I-F substrate) coils are not subject to coil breaks after coating in an as-received condition or during subsequent processing.
- Properly processed DDS with a low carbon substrate is not subject to coil breaks after coating-box anneal and temper rolling during subsequent processing. However, due to roll diameter on the delivery section of the galvanized line, at coil thicknesses above 0.060 in. (1.5 mm) the coil coming off of the coating line may contain coil breaks. These breaks will be "smoothed/masked" during temper rolling, but may still be visible in the as-received coil.
- ULTRASMMOOTH or EXTRASMMOOTH finish is required to minimize the risk of coil breaks during subsequent processing on coils with a low-carbon substrate. Again, a low-carbon coil above 0.060 in. (1.5 mm) thickness may contain smoothed/masked coil breaks in the as-received condition.
- CS Type B Min Spangle coils are subject to coil breaks/leveler breaks in the as-received condition and during subsequent processing. An ULTRASMMOOTH or EXTRASMMOOTH finish is required to minimize coil breaks during subsequent processing. This effect is temporary due to this grade being prone to aging (typical YPE return is 45 days). In thickness above 0.060 in. (1.5 mm) there may be smoothed/masked coil breaks from the exit end of the coating line still visible on these finishes.

\*Aluminized does not have Min Spangle or ULTRASMMOOTH designations.

## Rust

Discoloration and stain are inherent hazards when moisture, including in-transit weather condensation, accumulates between laps of coils or between sheets. AK Steel Corporation will not consider either deferred or immediate claims for rust:

1. When material is ordered dry or without suitable surface treatment.
2. When orders specify packaging without at least the minimum protection.
3. When material is stored outdoors or not protected against moisture or sudden temperature change.

**Note:** If the material arrives and the coil temperature is below the dew point of the coil storage facility, do not unpackage the coil until the coil reaches ambient temperature.

AK Steel will consider claims for wet storage stain only if the following requirements have been met in normal transit:

1. Material is ordered Chemical Treated, Chemical Treated and Oiled, or Oiled.
2. Material is ordered with packaging (waterproof paper or stretch wrap).
3. All shipments are inspected immediately for moisture on the package. If evident, a notation of the condition must be made on the shipping papers in the presence of the steel hauler. The carrier must be notified. For material sold F.O.B. Mill, a claim should be filed against the carrier and the AK Steel Corporation Sales Office notified.
4. If no moisture is evident on the outside packaging, the steel is inspected immediately for moisture on in-transit condensation. If present, a complaint should be presented immediately.

## **Freight Claims**

These guidelines are intended to help clarify the proper procedures for handling claims for material damaged or lost in transit. Complete understanding of the following points by personnel involved in receiving and claim processing will improve communications with carriers and may help to expedite the settlement of claims.

- The consignee must accept all shipments unless the goods are valueless. Goods which have a scrap value may not be valueless. Refusal to accept goods may result in back charges.
- Photographs of damaged goods are helpful for settling claims quickly, especially if the damaged goods are photographed in place on carrier's equipment.
- The consignee must mitigate the loss by storing and protecting the goods from further deterioration and assist in the repair and salvage, unless the carrier agrees that goods are valueless.
- All costs can be claimed.
- Loss and/or damage can be either visible on delivery to the consignee or concealed and not discovered for an indeterminate length of time. Each situation requires a specific method of handling as previously outlined.
- Loss and/or damage claims must be filed with appropriate claim agent of the delivering carrier within 9 months after delivery of material.
- When shipments are made F.O.B. origin, the buyer files the claim. When shipment is made F.O.B. destination, the seller files the claim. A formal claim must include the following:
  1. Original Bill of Lading or Bond of Indemnity
  2. Original paid Freight Bill or Bond of Indemnity
  3. Pricing letter stating cost of material
  4. Delivery receipt with loss and/or damage notation (motor carrier only)
  5. Inspection report
  6. Itemized statement of all loss and/or damage costs including mitigation costs
  7. Photographs, if available
  8. Any other supporting documents

For further assistance, contact your AK Steel Sales Representative.

## **Claims Exceptions**

Full Hard Cold Roll is provided directly off the Cold Mill unless further processing is stipulated by the customer. This product is shipped with off gauge coil ends and thus is not subject to the yield standards established for sheet mill products having additional processing.

## GUIDELINES

### Coil Weight

A full weight coil is any coil weighing more than 80% of the specified maximum coil weight which is negotiated with the customer on the basis of our normal production practice. Up to 20% of the ordered item quantity may include light weight coils. A light coil being any coil between 50% and 80% of the specified maximum coil weight.

### Permissible Variation From Ordered Quantity

#### All Products Except Hot Rolled

Items of 80,000 and over . . . . . 5% over or 5% under  
 Items of 80,000 thru 40,000 . . . . . 10% over or 5% under  
 Items of 40,000 thru 20,000 . . . . . 15% over or 10% under

#### Hot Rolled Products Only

Items of 80,000 and over . . . . . 10% over or 10% under  
 Items under 80,000 thru 40,000 . . . . . 15% over or 15% under  
 Items under 40,000 thru 20,000 . . . . . 20% over or 20% under

## TOLERANCE TABLES

Hot Rolled

### Specified Thickness Tolerances

Coils and Cut Lengths, Carbon and Structural Steels (ASTM A568/A635)

Width (in.)	Thickness (in.)							
	0.069 to 0.071, incl.	Over 0.071 to 0.098, incl.	Over 0.098 to 0.180, excl.	0.180 to 0.230, excl.	0.230 to 0.313, incl.	Over 0.313 to 0.375, incl.	Over 0.375 to 0.500, incl.	Over 0.500 to 0.525, incl.
Minimum Tolerances, All Plus								
Over 0 to 40	0.009	0.010	0.010	0.012	0.016	0.018	0.021	0.022
Over 40 to 48	0.009	0.010	0.012	0.014	0.018	0.020	0.021	0.022
Over 48 to 60	0.010	0.010	0.012	0.015	0.018	0.021	0.022	0.024
Over 60 to 72	0.010	0.012	0.012	0.016	0.020	0.022	0.024	0.027
Over 72	–	0.012	0.012	0.018	0.022	0.024	–	–
Nominal Tolerances, Plus and Minus								
Over 0 to 40	0.0045	0.0050	0.0050	0.0060	0.0080	0.0090	0.0105	0.0110
Over 40 to 48	0.0045	0.0050	0.0060	0.0070	0.0090	0.0100	0.0105	0.0110
Over 48 to 60	0.0050	0.0050	0.0060	0.0075	0.0090	0.0105	0.0110	0.0120
Over 60 to 72	0.0050	0.0060	0.0060	0.0080	0.0100	0.0110	0.0120	0.0135
Over 72	–	0.0060	0.0060	0.0090	0.0110	0.0120	–	–

Thickness is measured at any point across the width not less than 0.625 in. from a cut edge and not less than 1 in. from a mill edge. The above table does not apply to the uncropped ends of mill edge coils.



### Coils and Cut Lengths, Carbon and Structural Steels (ASTM A568/A635)

Width (mm)	Thickness (mm)							
	Through 2.0	Over 2.0 to 2.5, incl.	Over 2.5 to 4.5, excl.	4.5 to 6.0, excl.	6.0 to 8.0, incl.	Over 8.0 to 10.0, incl.	Over 10.0 to 12.5, incl.	Over 12.5 to 13.3, incl.
<b>Minimum Tolerances, All Plus</b>								
Over 0 to 1200	0.26	0.30	0.34	0.38	0.45	0.48	0.52	0.57
Over 1200 to 1500	0.26	0.30	0.38	0.38	0.45	0.52	0.57	0.60
Over 1500 to 1800	0.30	0.34	0.41	0.42	0.48	0.57	0.60	0.68
Over 1800	–	0.34	0.45	0.45	0.54	0.60	–	–
<b>Nominal Tolerances, Plus and Minus</b>								
Over 0 to 1200	0.130	0.150	0.170	0.190	0.225	0.240	0.260	0.285
Over 1200 to 1500	0.130	0.150	0.190	0.190	0.225	0.260	0.285	0.300
Over 1500 to 1800	0.150	0.170	0.205	0.210	0.240	0.285	0.300	0.340
Over 1800	–	0.170	0.225	0.225	0.270	0.300	–	–

Thickness is measured at any point across the width not less than 15 mm from a cut edge and not less than 25 mm from a mill edge. The above table does not apply to the uncropped ends of mill edge coils.

### Coils and Cut Lengths, Alloy Steels (ASTM A505/A635)

Width (in.)	Thickness (in.)							
	0.071 to 0.0821, incl.	Over 0.0821 to 0.0971, incl.	Over 0.0971 to 0.1799, incl.	Over 0.1799 to 0.2299, incl.	0.230 to 0.313, incl.	Over 0.313 to 0.375, incl.	Over 0.375 to 0.500, incl.	Over 0.500 to 0.525, incl.
<b>Minimum Tolerances, All Plus</b>								
Over 0 to 32	0.014	0.014	0.016	0.018	0.016	0.018	0.021	0.022
Over 32 to 40	0.014	0.016	0.018	0.018	0.016	0.018	0.021	0.022
Over 40 to 48	0.014	0.016	0.020	0.020	0.018	0.020	0.021	0.022
Over 48 to 60	0.014	0.016	0.020	0.020	0.018	0.021	0.022	0.024
Over 60 to 61.5	0.016	0.018	0.022	0.022	0.020	0.022	0.024	0.027
<b>Nominal Tolerances, Plus and Minus</b>								
Over 0 to 32	0.0070	0.0070	0.0080	0.0090	0.0080	0.0090	0.0105	0.0110
Over 32 to 40	0.0070	0.0080	0.0090	0.0090	0.0080	0.0090	0.0105	0.0110
Over 40 to 48	0.0070	0.0080	0.0100	0.0100	0.0090	0.0100	0.0105	0.0110
Over 48 to 60	0.0070	0.0080	0.0100	0.0100	0.0090	0.0105	0.0110	0.0120
Over 60 to 61.5	0.0080	0.0090	0.0110	0.0110	0.0100	0.0110	0.0120	0.0135

Thickness is measured at any point across the width not less than 0.375 in. from a cut edge and not less than 0.75 in. from a mill edge for gauges less than 0.230 in. Thickness is measured at any point across the width not less than 0.625 in. from a cut edge and not less than 1 in. from a mill edge for gauges greater than or equal to 0.230 in. The above table does not apply to the uncropped ends of mill edge coils.

## Specified Thickness Tolerances

### Coils and Cut Lengths, High-Strength Low-Alloy Steel (ASTM A568/A635)

Width (in.)	Thickness (in.)							
	Over 0.070 to 0.082, incl.	Over 0.082 to 0.098, incl.	Over 0.098 to 0.180, excl.	0.180 to 0.230, excl.	0.230 to 0.313, incl.	Over 0.313 to 0.375, incl.	Over .0375 to 0.500, incl.	Over 0.500 to 0.525, incl.
Minimum Tolerances, All Plus								
Over 0 to 32	0.010	0.010	0.012	0.014	0.016	0.018	0.021	0.022
Over 32 to 40	0.010	0.012	0.012	0.014	0.016	0.018	0.021	0.022
Over 40 to 48	0.010	0.012	0.015	0.015	0.018	0.020	0.021	0.022
Over 48 to 60	0.010	0.012	0.015	0.015	0.018	0.021	0.022	0.024
Over 60 to 72	0.012	0.014	0.016	0.016	0.020	0.022	0.024	0.027
Over 72	–	0.014	0.018	0.018	0.022	0.024	–	–
Nominal Tolerances, Plus and Minus								
Over 0 to 32	0.0050	0.0050	0.0060	0.0070	0.0080	0.0090	0.0105	0.0110
Over 32 to 40	0.0050	0.0060	0.0060	0.0070	0.0080	0.0090	0.0105	0.0110
Over 40 to 48	0.0050	0.0060	0.0075	0.0075	0.0090	0.0100	0.0105	0.0110
Over 48 to 60	0.0050	0.0060	0.0075	0.0075	0.0090	0.0105	0.0110	0.0120
Over 60 to 72	0.0060	0.0070	0.0080	0.0080	0.0100	0.0110	0.0120	0.0135
Over 72	–	0.0070	0.0090	0.0090	0.0110	0.0120	–	–

Thickness is measured at any point across the width not less than 0.625 in. from a cut edge and not less than 1 in. from a mill edge. The above table does not apply to the uncropped ends of mill edge coils.

Width (mm)	Thickness (mm)							
	Through 2.0	Over 2.0 to 2.5, incl.	Over 2.5 to 4.5, excl.	4.5 to 6.0, excl.	6.0 to 8.0, incl.	Over 8.0 to 10.0, incl.	Over 10.0 to 12.5, incl.	Over 12.5 to 13.3, incl.
Minimum Tolerances, All Plus								
Over 0 to 1200	0.26	0.30	0.34	0.38	0.45	0.48	0.52	0.57
Over 1200 to 1500	0.26	0.30	0.38	0.38	0.45	0.52	0.57	0.60
Over 1500 to 1800	0.30	0.34	0.41	0.42	0.48	0.57	0.60	0.68
Over 1800	–	0.34	0.45	0.45	0.54	0.60	–	–
Nominal Tolerances, Plus and Minus								
Over 0 to 1200	0.130	0.150	0.170	0.190	0.225	0.240	0.260	0.285
Over 1200 to 1500	0.130	0.150	0.190	0.190	0.225	0.260	0.285	0.300
Over 1500 to 1800	0.150	0.170	0.205	0.210	0.240	0.285	0.300	0.340
Over 1800	–	0.170	0.225	0.225	0.270	0.300	–	–

Thickness is measured at any point across the width not less than 15 mm from a cut edge and not less than 25 mm from a mill edge. The above table does not apply to the uncropped ends of mill edge coils.

Width (mm)	Thickness (mm)							
	Through 2.08, incl.	Over 2.08 to 2.46, incl.	Over 2.46 to 4.56, incl.	Over 4.56 to 6.0, excl.	6.0 to 8.0, incl.	Over 8.0 to 10.0, incl.	Over 10.0 to 12.5, incl.	Over 12.5 to 13.3, incl.
Minimum Tolerances, All Plus								
Over 0 to 810	0.36	0.36	0.40	0.46	0.45	0.48	0.52	0.57
Over 810 to 1020	0.36	0.40	0.46	0.46	0.45	0.48	0.52	0.57
Over 1020 to 1200	0.36	0.40	0.50	0.50	0.45	0.48	0.52	0.57
Over 1200 to 1220	0.36	0.40	0.50	0.50	0.45	0.52	0.57	0.60
Over 1220 to 1500	0.36	0.40	0.50	0.50	0.45	0.52	0.57	0.60
Over 1500 to 1520	0.36	0.40	0.50	0.56	0.48	0.57	0.60	0.68
Over 1520 to 1562	0.40	0.46	0.56	0.56	0.48	0.57	0.60	0.68
Nominal Tolerances, Plus and Minus								
Over 0 to 810	0.180	0.180	0.200	0.230	0.225	0.240	0.260	0.285
Over 810 to 1020	0.180	0.200	0.230	0.230	0.225	0.240	0.260	0.285
Over 1020 to 1200	0.180	0.200	0.250	0.250	0.225	0.240	0.260	0.285
Over 1200 to 1220	0.180	0.200	0.250	0.250	0.225	0.260	0.285	0.300
Over 1220 to 1500	0.180	0.200	0.250	0.250	0.225	0.260	0.285	0.300
Over 1500 to 1520	0.180	0.200	0.250	0.280	0.240	0.285	0.300	0.340
Over 1520 to 1562	0.200	0.230	0.280	0.280	0.240	0.285	0.300	0.340

Thickness is measured at any point across the width not less than 9.5 mm from a cut edge and not less than 19 mm from a mill edge for gauges less than 6.0 mm. Thickness is measured at any point across the width not less than 15 mm from a cut edge and not less than 25 mm from a mill edge for gauges greater than or equal to 6.0 mm. The above table does not apply to the uncropped ends of mill edge coils.

## Specified Width Tolerances

### Hot Rolled Cut Edge

For Carbon, Structural Steel and HSLAS			
All Gauges			
Width (in.)	Tolerance Over, No Tolerance Under (in.)	Width (mm)	Tolerance Over, No Tolerance Under (mm)
0 to 30, incl.	0.125	0 to 600, incl.	3
Over 30 to 48	0.1875	Over 600 to 1200	5
Over 48 to 60	0.25	Over 1200 to 1500	6
Over 60 to 80	0.3125	Over 1500 to 1800	8
		Over 1800	10

For Alloy Steel - (in.)			
Gauges Less Than 0.230 in.		Gauges 0.230 in. and Greater	
Width (in.)	Tolerance Over, No Tolerance Under (in.)	Width (in.)	Tolerance Over, No Tolerance Under (in.)
0 to 30, incl.	0.1875	0 to 30, incl.	0.125
Over 30 to 50, incl.	0.25	Over 30 to 48	0.1875
Over 50 to 65, incl.	0.3125	Over 48 to 60	0.25
		Over 60 to 80	0.3125

## Specified Width Tolerances

For Alloy Steel - (mm)			
Gauges Less Than 6 mm		Gauges 6 mm and Greater	
Width (mm)	Tolerance Over, No Tolerance Under (mm)	Width (mm)	Tolerance Over, No Tolerance Under (mm)
0 to 760, incl.	4.8	0 to 600, incl.	3
Over 760 to 1270, incl.	6.35	Over 600 to 1200	5
Over 1270 to 1650, incl.	7.9	Over 1200 to 1500	6
		Over 1500 to 1650	8

### Hot Rolled Mill Edge

Carbon and Structural Steel - (in.)			
Gauges Less Than 0.230 in.		Gauges 0.230 in. and Greater	
Width (in.)	Tolerance Over, No Tolerance Under (in.)	Width (in.)	Tolerance Over, No Tolerance Under (in.)
Under 25	Cut Edge Only	Under 25	Cut Edge Only
25 to 26	0.8125	25 to 26	0.8125
Over 26 to 30	0.9375	Over 26 to 28	0.9375
Over 30 to 50	1.125	Over 28 to 35	1.125
Over 50 to 78	1.5	Over 35 to 50	1.25
Over 78	1.875	Over 50 to 60	1.5
		Over 60 to 65	1.625
		Over 65 to 70	1.75
		Over 70 to 80	1.875

High-Strength Low-Alloy Steel			
All Gauges			
Width (in.)	Tolerance Over, No Tolerance Under (in.)	Width (mm)	Tolerance Over, No Tolerance Under (mm)
Under 25	Cut Edge Only	Over 600, incl.	Cut Edge Only
25 to 26	0.8125	Over 600 to 1200	28
Over 26 to 28	0.9375	Over 1200 to 1500	38
Over 28 to 35	1.125	Over 1500 to 1800	45
Over 35 to 50	1.25	Over 1800	50
Over 50 to 60	1.5		
Over 60 to 65	1.625		
Over 65 to 70	1.75		
Over 70 to 80	1.875		

## Specified Width Tolerances

Carbon and Structural Steel - (mm)			
Gauges Less Than 6 mm		Gauges 6 mm and Greater	
Width (mm)	Tolerance Over, No Tolerance Under (mm)	Width (mm)	Tolerance Over, No Tolerance Under (mm)
0 to 600, incl.	Cut Edge Only	0 to 600, incl.	Cut Edge Only
Over 600 to 1200	26	Over 600 to 1200	28
Over 1200 to 1500	32	Over 1200 to 1500	38
Over 1500 to 1800	35	Over 1500 to 1800	45
Over 1800	48	Over 1800	50

## Specified Flatness Tolerances

For Alloy Steel - (in.)			
Gauges Less Than 0.230 in.		Gauges 0.230 in. and Greater	
Width (in.)	Tolerance Over, No Tolerance Under (in.)	Width (in.)	Tolerance Over, No Tolerance Under (in.)
Under 25	Cut Edge Only	Under 25	Cut Edge Only
25 to 26, excl.	0.8125	25 to 26	0.8125
26 to 28, excl.	0.9375	Over 26 to 28	0.9375
28 to 35, excl.	1.125	Over 28 to 35	1.125
35 to 50, excl.	1.25	Over 35 to 50	1.25
50 to 60, excl.	1.5	Over 50 to 60	1.5
60 to 65, excl.	1.625	Over 60 to 65	1.625

For Alloy Steel - (mm)			
Gauges Less Than 6 mm		Gauges 6 mm and Greater	
Width (mm)	Tolerance Over, No Tolerance Under (mm)	Width (mm)	Tolerance Over, No Tolerance Under (mm)
0 to 610, incl.	Cut Edge Only	0 to 600, incl.	Cut Edge Only
610 to 660, excl.	20.6	Over 600 to 1200	28
660 to 710, excl.	23.8	Over 1200 to 1500	38
710 to 890, excl.	28.6	Over 1500 to 1650	45
890 to 1270, excl.	31.8		
1270 to 1520, excl.	38.1		
1520 to 1650, excl.	41.3		



## Specified Flatness Tolerances

### Hot Rolled Sheet — Not Temper Rolled

Thickness (in.)		Width (in.)		
NOM	MIN	to 60	Over 60 to 72	Over 72
		less than 45 ksi. Specified Yield Strength		
0.076 to 0.186	0.071 to 0.180	1.5	2.25	3.0
0.186 to 0.238	0.180 to 0.230	1.5	2.25	3.0
		45 to 50 ksi. Specified Yield Strength		
0.076 to 0.186	0.071 to 0.180	2.25	3.375	4.5
0.186 to 0.238	0.180 to 0.230	2.25	3.375	4.5

Not specified to restrictive flatness. Maximum deviation from a horizontal flat surface. Tolerances are subject to inquiry when specified minimum yield strength is 45 ksi. or higher. This table is AK Steel Corporation standards and applied to lengths cut from the body of a coil. The buyer should not expect that steel which is cut from coils will meet these standards unless adequate flattening operations are performed. You should discuss coil flatness standards and how they apply to your specified end use with an AK Steel Representative. This table is the standard ASTM A568 latest revision.

### Temper Rolled Sheet — Including Pickled Sheets

Thickness (in.)		Width (in.)		
NOM	MIN	to 60	Over 60 to 72	Over 72
		less than 45 ksi. Specified Yield Strength		
0.076 to 0.187	0.071 to 0.180	0.50	0.75	1.0
0.188 to 0.238	0.181 to 0.230	0.50	0.75	1.0
		45 to 60 ksi. Specified Yield Strength		
0.076 to 0.187	0.071 to 0.180	0.75	1.125	1.5
0.188 to 0.238	0.181 to 0.230	0.75	1.125	1.5

Not specified to restrictive flatness. Maximum deviation from a horizontal flat surface. The above table applies to sheet cut to length by the customer from coils when adequate flattening operations are performed.

## Camber

Coil Widths over 12 in. maximum 1 in. in any 20 ft. of length.

## TOLERANCE TABLES

UNIVIT, I-F Enameling Steel, VIT-PLUS, Cold Rolled Sheet, ZINCGRIP ELECTRASMOOTH\*

### Specified Thickness Tolerances

Width (in.)	Thickness (in.)					
	Over 0 to 0.019	Over 0.019 to 0.039	Over 0.039 to 0.057	Over 0.057 to 0.071	Over 0.071 to 0.098	Over 0.098 to 0.142
<b>MIN</b>	Minimum Tolerances, All Plus					
Over 0 to 72	0.002	0.003	0.004	0.005	0.005	0.006
Over 72	0.002	0.003	0.004	0.005	0.006	0.007
<b>NOM</b>	Nominal Tolerances, Plus and Minus					
Over 0 to 72	0.001	0.0015	0.002	0.0025	0.0025	0.003
Over 72	0.001	0.0015	0.002	0.0025	0.003	0.0035

Thickness is measured at any point on the sheet not less than 1 in. from an edge. This table is the ASTM thickness tolerance at 1 in. from an edge.

Width (mm)	Thickness (mm)				
	Over 0 to 0.4	Over 0.4 to 1.0	Over 1.0 to 1.2	Over 1.2 to 2.5	Over 2.5 to 4.0
<b>MIN</b>	Minimum Tolerances, All Plus				
Over 0 to 1800	0.05	0.08	0.10	0.12	0.15
Over 1800	0.06	0.08	0.10	0.15	0.18
<b>NOM</b>	Nominal Tolerances, Plus and Minus				
Over 0 to 1800	0.025	0.04	0.05	0.06	0.075
Over 1800	0.03	0.04	0.05	0.075	0.09

\*See specific product section for manufacturing limits.

### Specified Width Tolerance

### Coils and Cut Lengths

Width (in.)	All Gauges	Width (mm)	All Gauges
Over 0 to 2		Over 0 to 50	
Over 2 to 6	0.012	Over 50 to 100	0.3
Over 6 to 9	0.016	Over 100 to 200	0.4
Over 9 to 12	0.032	Over 200 to 300	0.8
Over 12 to 30	0.125	Over 300 to 600	3
Over 30 to 48	0.1875	Over 600 to 1200	5
Over 48 to 60	0.25	Over 1200 to 1500	6
Over 60 to 80	0.3125	Over 1500 to 1800	8
Over 80	0.375	Over 1800	10

Tolerance over specified width — no tolerance under.

Widths over 12 in. maximum 1 in. in any 20 feet of length.

### Camber

## Flatness Tolerances

Specified Width (in.)	Thickness (in.)			
	Min. to 0.044 < 45 ksi.	Min. to 0.044 45 to 50 ksi.	Min. > 0.044 < 45 ksi.	Min. > 0.044 45 to 50 ksi.
Up to 36	0.375	0.750	0.250	0.750
Over 36 to 60	0.625	1.125	0.375	0.750
Over 60 to 72	0.875	1.50	0.625	1.125
Over 72	0.875	1.50	0.875	1.50

Sheets not specified to restricted flatness. Maximum deviation from a horizontal flat surface. The above table applies to sheets cut to length by the customer from coils when adequate flattening operations are performed. It does not apply when product is ordered full hard or to a hardness range.

## TOLERANCE TABLES

Aluminized Type 1, Aluminized Type 2, ZINCGRIP, ZINCGRIP GA

### Specified Thickness Tolerances

Width (in.)	Thickness (in.)					
	Over 0 to 0.023	Over 0.023 to 0.043	Over 0.043 to 0.061	Over 0.061 to 0.075	Over 0.075 to 0.101	Over 0.101 to 0.187
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>					
Over 0 to 32	0.003	0.004	0.005	0.006	0.010	0.012
Over 32 to 40	0.003	0.004	0.005	0.006	0.012	0.012
Over 40 to 60	0.003	0.004	0.005	0.006	0.012	0.014
Over 60	0.003	0.004	0.005	0.006	0.014	0.014
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>					
Over 0 to 32	0.0015	0.002	0.0025	0.003	0.005	0.006
Over 32 to 40	0.0015	0.002	0.0025	0.003	0.006	0.006
Over 40 to 60	0.0015	0.002	0.0025	0.003	0.006	0.007
Over 60	0.0015	0.002	0.0025	0.003	0.007	0.007

Thickness is measured on the coated sheet and includes the coating thickness. Thickness is measured at any point on the sheet not less than 1 in. from an edge. This table is equivalent to what was consider ASTM restricted tolerance which is now called thickness tolerance at 1 in. from edge.

	Thickness (mm)					
	Over 0 to 0.4	Over 0.4 to 1.0	Over 1.0 to 1.5	Over 1.5 to 2.0	Over 2.0 to 2.5	Over 2.5 to 5.0
<b>MIN</b>	<b>Minimum Tolerances, All Plus</b>					
Over 0 to 1500	0.08	0.10	0.13	0.15	0.30	0.34
Over 1500	0.08	0.10	0.13	0.15	0.34	0.34
<b>NOM</b>	<b>Nominal Tolerances, Plus and Minus</b>					
Over 0 to 1500	0.04	0.05	0.065	0.075	0.15	0.17
Over 1500	0.04	0.05	0.065	0.075	0.17	0.17

Aluminized  $\geq 0.110$  in. min and  $\geq 2.8$  mm HR substrate will be used.

## Specified Width Tolerance

## Coils and Cut Lengths

Width (in.)	Tolerance Over, No Tolerance Under (in.)			
	to 0.068	Over 0.068 to 0.083	Over 0.083 to 0.110	Over 0.110
Over 2 to 6	0.008	0.012	0.016	0.032
Over 6 to 9	0.016	0.016	0.032	0.032
Over 9 to 12	0.032	0.032	0.032	0.032
Over 12 to 30	0.125	0.125	0.125	0.125
Over 30 to 48	0.1875	0.1875	0.1875	0.1875
Over 48 to 60	0.250	0.250	0.250	0.250
Over 60	0.3125	0.3125	0.3125	0.3125

Width (mm)	All Gauges
Over 0 to 50	
Over 50 to 100	0.3
Over 100 to 200	0.4
Over 200 to 300	0.8
Over 300 to 600	3
Over 600 to 1200	5
Over 1200 to 1500	6
Over 1500	8

Tolerance over specified width in.  
— no tolerance under.

## Camber

Widths over 12 in. maximum 1 in. in any 20 ft. of length.

## Flatness Tolerances

Specified Width (in.)	Thickness (in.)			
	Minimum to 0.048	Nominal to 0.050	Minimum over 0.048	Nominal over 0.050
Up to 36	0.375	0.375	0.250	0.250
Over 36 to 60	0.625	0.625	0.375	0.375
Over 60 to 72	0.875	0.875	0.625	0.625

Sheets not specified to restricted flatness. Maximum deviation from a horizontal flat surface. The above table applies to sheets cut to length by the customer from coils when adequate flattening operations are performed. It does not apply when product is ordered to a hardness range. For example, structural steel and HSLAS.

## SPECIFICATIONS AND STANDARDS DIRECTORY

Specification	Product	Grade/Quality	Applicable AK Steel Product
ASTM A1008	Cold Rolled	CSTB, Structural Steel (SS), DSTB, DDS, HSLAS, EDDS, EDDS+, HSLA-F	Cold Rolled, consult your AK Steel Representative
ASTM A424	UNIVIT, VIT-PLUS, I-F Enameling	CS, DS EDDS for Porcelain Enameling	UNIVIT, VIT-PLUS, I-F Enameling
ASTM A463	Aluminized Steel T1 and T2	CSTB, DDS, EDDS, SS, HSLAS, FSTB	AL-T1, AL-T2
ASTM A568	Hot Rolled and Cold Rolled	General Requirement	Hot Rolled and Cold Rolled
ASTM A1011	Hot Rolled	CSTB, DSTB, SS, HSLAS, HSLA-F	Hot Rolled, consult your AK Steel Representative
ASTM A635	Hot Rolled	Heavy Gauge Hot Rolled & Conversion to plate general requirements	
ASTM A653	Galvanized and Galvannealed	CSTB, DDS, EDDS, EDDS+ SS, HSLAS, FSTB, HSLA-F	Galvanized and Galvannealed
ASTM A659	Hot Rolled	Hot Rolled CS (carbon 0.16 to 0.25%)	Consult your AK Steel Representative
ASTM A749	General requirement for HSLA Hot Rolled	HSLAS	Hot Rolled
ASTM A755	H.D. metallic coated and painted for exposed building panels	SS, HSLAS	Painted AL-T2 or painted ZINCGRIP
ASTM A794	Cold Rolled	CS carbon (0.16 to 0.25%)	Cold Rolled
ASTM A879	Electrogalvanized sheets	General coating requirement	ELECTRASMOOTH
ASTM A917	Electrogalvanized general requirement	General coating requirement	ELECTRASMOOTH
ASTM A924	ZINCGRIP and AL-T1	General requirement for Metallic Coated by the Hot Dip Process	ZINCGRIP and AL-T1
ASTM A929	Hot dipped steel sheet for Corrugated Steel Pipe	General requirement	AL-T2 CSP (Culvert) Galvanized Culvert Sheets
ASTM A1018	Hot Rolled	Hot Rolled heavy thickness, HSLAS, CSTB DSTB, SS, HSLA-F	Hot Rolled
AASHTO M-218	Galvanized Culvert Sheets	Galvanized Culvert Sheets	Galvanized Culvert Sheets
AASHTO M-274	AL-T2 CSP (Culvert) Corrugated Steel Pipe	AL-T2 CSP Grade (1.00 oz, coating)	AL-T2 CSP (Culvert)
SAE J1392	Hot Rolled and Cold Rolled	High Strength (Metric Units)	Consult your AK Steel Representative
SAE J2329	Hot Rolled, Cold Rolled and coated	Properties of Low Carbon Steels	Consult your AK Steel Representative
SAE J2340	Hot Rolled and Cold Rolled	High Strength (Metric Units)	Consult your AK Steel Representative

For any standards or specifications not referenced here, contact your AK Steel Representative.



## OBSOLETE AND REPLACEMENT STANDARDS

The following is a cross reference of the obsolete ASTM Standards with their current replacements.

Old Specification	Product	Quality	New Specification
ASTM A525	ZG	General Requirements	ASTM A924
ASTM A526	ZG	CQ	ASTM A653
ASTM A527	ZG	LFQ	ASTM A653
ASTM A642	ZG	DQSK	ASTM A653
ASTM A446	ZG	Structural Quality	ASTM A653
ASTM A444	ZG	Galvanized Culvert Sheets	ASTM A929
ASTM A819	ALUM T-2	Corrugated Steel Pipe	ASTM A929
ASTM A366	CR	CSTB/CQ	ASTM A1008
ASTM A611	CR	Structural Quality/SS	ASTM A1008
ASTM A620	CR	DSTB/DQSK	ASTM A1008
ASTM A969	CR	EDDS	ASTM A1008
ASTM A607	CR	HSLA	ASTM A1008
ASTM A715	CR	HSLA-F Improved Formability	ASTM A1008
ASTM A569	HR	CS	ASTM A1011
ASTM A570	HR	Structural Steel	ASTM A1011
ASTM A622	HR	DS	ASTM A1011
ASTM A715	HR	HSLA with Improved Formability	ASTM A1011
ASTM A607	HR	HSLA	ASTM A1011

## METRIC CONVERSION FACTORS

The following list contains the common metric and other conversions that may be applicable for purposes of ordering carbon steel sheet products.

	Convert From	Convert To	Multiply By
<b>Length</b>	inch (in.)	millimeters (mm)	25.4
	foot (ft.)	meter (m)	0.3048
	inch (in.)	mil	1000
	millimeters (mm)	inch (in.)	0.03937008
	microinches	micrometer or micron	0.0254
	micrometers or microns	microinch	39.37008
<b>Weight</b>	ounce (oz.)	grams (g)	28.34952
	pound (lb.)	grams (g)	453.5924
	pound (lb.)	kilograms (kg)	0.4535924
	ton	metric ton	0.9071847
	metric ton	kilogram (kg)	1000
	metric ton	pounds (lb.)	2205
	kilogram (kg)	pounds (lb.)	2.204623
<b>Coating Weight</b>	ounce/square foot (oz./ft. <sup>2</sup> )	grams/square meter (g/m <sup>2</sup> )	305.1517
	grams/square meter (g/m <sup>2</sup> )	ounces/square foot (oz./ft. <sup>2</sup> )	0.00327705
<b>Density</b>	pound/cubic inch (lb./in. <sup>3</sup> )	grams/cubic centimeter (gm/cm <sup>3</sup> )	27.68
	grams/cubic centimeter (gm/cm <sup>3</sup> )	pounds/cubic inch (lb./in. <sup>3</sup> )	0.0361273
<b>Strength</b>	pounds/square inch (psi.)	ksi (1000 psi.)	0.001
	ksi.	megapascal (MPa)	6.895
	pounds/square inch (psi.)	megapascal (MPa)	0.006894757
	newton/square millimeter (N/mm <sup>2</sup> )	megapascal (MPa)	1
	pounds/square inch (psi.)	newton/square millimeter (N/mm <sup>2</sup> )	0.006895
	ksi.	newton/square millimeter (N/mm <sup>2</sup> )	6.895
	ksi.	kilograms/square millimeter (kg/mm <sup>2</sup> )	0.704
	kilograms/square millimeter (kg/mm <sup>2</sup> )	pounds/square inch (lb./in. <sup>2</sup> )	1422.334
	megapascal (MPa)	pounds/square inch (lb./in. <sup>2</sup> )	145.0377
	kilograms/square millimeter (kg/mm <sup>2</sup> )	megapascal (MPa)	9.80665
<b>Price</b>	\$/100 lb.	\$/100 kg	2.204623
	\$/100 kg	\$/100 lb.	0.4535924

# Hot Rolled Sheet

## PRODUCT DESCRIPTION

### Products

Our base product is a hot rolled, unpickled, mill edge, coiled product. The product is produced directly off the hot strip mill; therefore, it is not pickled, oiled, temper rolled, side trimmed nor cropped back to gauge, and is susceptible to coil breaks. Exposed surface quality can not be guaranteed on material requiring high coiling temperatures, boron grades, or material with greater than 0.10% carbon. The product is produced to a specified nominal or minimum thickness and sold on an actual weight basis.

**Works Price Base Per 100 Pounds** Hot Rolled Sheet . . . . . Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel Type A, Type B, and Type C . . . . .	None
Drawing Steel Type B . . . . .	0.60
Drawing Steel Type B with Boron . . . . .	1.10
Deep Drawing Steel Type A and Type B . . . . .	1.50
Drawing Steel Type A (I-F) . . . . .	4.25
Specified Mechanical Properties . . . . .	1.25
Structural Steel (ASTM A1011 or A1018 SS Grade 36 Type 2 for conversion to A36) (c) . . . . .	1.15
Structural Steel ASTM A1011 (Max. thickness 0.229 in.)	
Grade 30 or 33 (a) . . . . .	0.50
Grade 36 Type 1 or 2 (a) . . . . .	1.15
Grade 40 (a) . . . . .	1.20
Grade 45 Type 1 only (a) . . . . .	1.30
Grade 50 (a) . . . . .	1.35
Grade 55 (a) . . . . .	1.50
Structural Steel ASTM A1018 (Thickness 0.230 in. and heavier)	
Grade 30 or 33 (a) . . . . .	0.50
Grade 36 (a) . . . . .	1.15
Grade 40 (a) . . . . .	1.20
Structural Steel ASTM A414 Grades C and G (a) . . . . .	2.75
Conversion to ASTM A414 Grades C and G (c) . . . . .	1.50

High Strength Low Alloy Steel (ASTM A1011, ASTM A1018 Bearing Class 1 or 2)

Grade 40 (a) . . . . .	0.75
Grade 45 (a) . . . . .	2.20
Grade 50 (a) . . . . .	2.35
Grade 55 (a) . . . . .	2.50
Grade 60 (a) . . . . .	2.75
Grade 65 (a) . . . . .	3.25

High Strength Low Alloy Steel with Improved Formability ASTM A1011, A1018 (b)

Grade 45F (a) . . . . .	2.50
Grade 50F (a) . . . . .	2.95
Grade 60F (a) . . . . .	3.25
Grade 65F (a) . . . . .	3.75
Grade 70F (a) . . . . .	4.50
Grade 80F (a) . . . . .	6.00

(a) Test reports are included in the extra.

(b) For HS quality not listed inquire.

(c) Conversion material only certified for one end.

**Size Extras**

Specified Thickness (in.)		Master Coil Width (in.)			
NOM	MIN	30 to under 60	60 to under 64	64 thru 70	Over 70
0.259 and thicker	0.250 and thicker	INQ	INQ	INQ	INQ
Under 0.259 - 0.188	Under 0.250 - 0.180	1.00	–	1.50	2.50
Under 0.188 - 0.097	Under 0.180 - 0.090	1.50	1.00	2.25	3.25
Under 0.097 - 0.076	Under 0.090 - 0.071	3.00	3.00	INQ	INQ

**Chemistry Extras**

When ordering the following standard SAE chemistries

1010, 1012 . . . . .	0.50
1009, 1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022 . . . . .	Inquire
1025, 1026, 1027, 1028, 1029 . . . . .	1.50

### SAE Chemical Composition Ranges (SAE J403)

SAE No.	Chemical Composition Limits*, %	
	Carbon	Manganese
1004	0.02 - 0.08	0.35 max
1005	0.06 max	0.35 max
1006	0.08 max	0.45 max
1008	0.10 max	0.50 max
1009	0.15 max	0.60 max
1010	0.08 - 0.13	0.30 - 0.60
1012	0.10 - 0.15	0.30 - 0.60
1013	0.11 - 0.16	0.30 - 0.60
1015	0.13 - 0.18	0.30 - 0.60
1016	0.13 - 0.18	0.60 - 0.90
1017	0.15 - 0.20	0.30 - 0.60
1018	0.15 - 0.20	0.60 - 0.90
1019	0.15 - 0.20	0.70 - 1.00
1020	0.18 - 0.23	0.30 - 0.60
1021	0.18 - 0.23	0.60 - 0.90
1022	0.18 - 0.23	0.70 - 1.00
1023	0.20 - 0.25	0.30 - 0.60
1025	0.22 - 0.28	0.30 - 0.60
1026	0.22 - 0.28	0.60 - 0.90
1029	0.25 - 0.31	0.60 - 0.90
1030	0.28 - 0.34	0.60 - 0.90
1033	0.30 - 0.36	0.70 - 1.00
1035	0.32 - 0.38	0.60 - 0.90
1037	0.32 - 0.38	0.70 - 1.00
1038	0.35 - 0.42	0.60 - 0.90
1039	0.37 - 0.44	0.70 - 1.00
1040	0.37 - 0.44	0.60 - 0.90
1042	0.40 - 0.47	0.60 - 0.90
1043	0.40 - 0.47	0.70 - 1.00
1044	0.43 - 0.50	0.30 - 0.60
1045	0.43 - 0.50	0.60 - 0.90
1046	0.43 - 0.50	0.70 - 1.00
1049	0.46 - 0.53	0.60 - 0.90
1050	0.48 - 0.55	0.60 - 0.90
1053	0.48 - 0.55	0.70 - 1.00
1055	0.50 - 0.60	0.60 - 0.90
1060	0.55 - 0.65	0.60 - 0.90
1065	0.60 - 0.70	0.60 - 0.90
1070	0.65 - 0.75	0.60 - 0.90
1074	0.70 - 0.80	0.50 - 0.80
1075	0.70 - 0.80	0.40 - 0.70
1078	0.72 - 0.85	0.30 - 0.60
1080	0.75 - 0.88	0.60 - 0.90

\*The maximum amounts of phosphorus and sulfur are 0.030% and 0.035%, respectively.  
Our normal practice includes significantly lower levels for both elements.



### High Carbon and Alloy Grade Extras

For gauge and width, please refer to the Hot Rolled Sheet Steel gauge and width table.

Applicable Hot Rolled Sheet extras also apply.

High Carbon	\$/cwt	Alloy	\$/cwt
1030	1.50	4118	INQ
1035	1.50	4130	INQ
1040	2.00	4135	INQ
1045	2.00	4140	INQ
1050	2.00	5115	INQ
1053	2.00	5120	INQ
1055	2.00	5140	INQ
1060	4.50	5150	INQ
1065	4.50	6150	INQ
1070	4.50	6158	INQ
1074	4.50	–	INQ
1075	4.50	–	–
1510	2.00	–	–
1518	2.00	–	–
1519	2.00	–	–
1524	2.00	–	–
1526	2.00	–	–
1527	2.00	–	–
1530	2.00	–	–
1532	2.00	–	–
Grade Not Listed Above	INQ	–	–

Quality	\$/cwt
Bearing Quality	1.00
Hardenability Grades	1.00

## Specified Chemistry

When specifications for carbon and/or manganese indicate maximums only, within the limits of carbon.

0.08% – 0.18% and/or manganese 0.45% – 0.60% . . . Inquire

For other association grades, chemistry range restrictions or customer specified chemistry, the following chemistry extras apply.

### Carbon and Manganese

Maximum of Carbon Range	Maximum of Manganese Range		
	thru 0.60	0.61 thru 0.90	0.91 thru 1.15
Specified less than 0.04	0.50	–	–
0.04 - 0.25	0.25	0.50	0.75

### Carbon and Manganese

For more restricted than standard SAE (see SAE Table on page 3.3) . . . . .

N/A

### Aluminum

Aluminum Killed-must be ordered in conjunction with Special Killed . . . . .

0.60

Specified Aluminum Content:

Aluminum 0.015% minimum or greater . . . . .

0.60

Aluminum Range . . . . .

0.60

\*Aluminum 0.035% maximum or less . . . . .

0.60

\*(Note: Special Killed and Aluminum extras applies)

### Nitrogen

When specified or required . . . . .

0.50

### Phosphorus

When a range is specified or required . . . . .

0.50

When restricted to less than 0.025% max. . . . .

0.50

### Sulfur

When a range is specified or required . . . . .

0.40

When restricted to less than 0.015% to 0.010% . . . . .

0.50

When restricted to less than 0.010% . . . . .

1.50

Other alloy additions including Niobium (Columbium) . . . . .

N/A

## Specified Coil Weight

1,000 pounds per inch of width and over . . . . .

None

Under 1,000 to 800 pounds per inch of width. . . . .

None

Under 800 pounds per inch of width . . . . .

2.00

## Restricted Tolerances

When thickness, width, length, or flatness tolerances are specified or required closer than standard, such tolerances will be considered on the basis of our ability to produce. Assessment of appropriate extras will be determined by analyzing the added scrap loss, labor, and machine time necessary to accomplish. This is only available for "cut edge" orders.

Restricted Gauge Tolerances . . . . .

1.50

Restricted Width Tolerance . . . . .

Inquire

**Processing Extras**

Refer to the Outside Processing section for extras not shown below.

Temper Rolled . . . . .	1.25
Cut Edge Black Band . . . . .	Inquire
Cut Edge Pickled Only . . . . .	0.50
Pickled (Oiled or Dry) through Carbon 0.25% max.	
0.076 nom. thru 0.179 nom. (0.071 min. thru 0.171 min.)	2.00
0.180 nom. thru 0.218 nom. (0.172 min. thru 0.210 min.)	2.50
Exposed . . . . .	Inquire
Pre-lube or dry film . . . . .	Inquire

**General Extras**

Refer to the General Pricing Information section for inventories and item quantity.

## MIDDLETOWN MANUFACTURING LIMITS

### Hot Rolled

Specified Thickness (in.)		Coil Width (in.) Maximum			
NOM	MIN	Low C	Strl Stl/ <sup>1</sup> Med C	HSLAS <sup>1</sup>	Ult Low C <sup>2</sup>
0.075 - 0.0848	0.070 - 0.0796	65	65	INQ	N/A
0.0849 - 0.0898	0.0797 - 0.0842	70	70	INQ	N/A
0.0899 - 0.2509 <sup>1</sup>	0.0843 - 0.2452	80	78	70	80
0.2510 - 0.380	0.2453 - 0.375	60	60	60	60

30 in. I.D. only, maximum carbon 0.25% only, cut length not available-must go to outside processor.  
If tempered rolled, the max gauge is 0.320 and the width max is 76 in.

<sup>1</sup> Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered.  
The information provided above is for the least restrictive products.

<sup>2</sup> Min gauge for Ult Low C is 0.100

<sup>3</sup> INQ for gauge > 0.350

### Hot Rolled Pickle Mill Edge

Specified Thickness (in.)		Coil Width (in.) Maximum			
NOM	MIN	Low C	Strl Stl/ <sup>1</sup> Med C	HSLAS <sup>1</sup>	Ult Low C <sup>2</sup>
0.075 - 0.0848	0.070 - 0.0796	65	65	INQ	INQ
0.0849 - 0.0889	0.0797 - 0.0846	70	70	INQ	INQ
0.0900 - 0.1499 <sup>2</sup>	0.0847 - 0.1444	80	78	70	80
0.1500 - 0.1799	0.1445 - 0.1744	75	75	70	75
0.1800 - 0.2090	0.1745 - 0.2038	67	67	60	67

If ordered Cut Edge, the width is 1 in. less than shown in the table. If tempered rolled, the max gauge is 0.320 and the width max is 76 in. If pickled, the max I.D. is 24 in.

<sup>1</sup> Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered.  
The information provided above is for the least restrictive products.

<sup>2</sup> Min gauge for Ult Low C is 0.100

## DEARBORN MANUFACTURING LIMITS

### Hot Rolled

Specified Thickness (in.)		Coil Width (in.) Maximum				
NOM	MIN	Low C	Strl Stl/ <sup>1</sup> Med C	Hi C/Alloy >0.35	HSLAS <sup>1</sup>	Ult Low C
0.076 - 0.0849	0.071 - 0.0799	62	60	INQ	56	N/A
0.085 - 0.0959	0.080 - 0.0909	62	62	52	60	N/A
0.096 - 0.1069	0.091 - 0.1009	62	62	52	62	N/A
0.107 - 0.2849	0.101 - 0.2759	62	62	58	62	62
0.285 - 0.525	0.276 - 0.518	62	62	58	INQ	62

28 in. I.D. only (24 in. if pickled)

<sup>1</sup> Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered.  
The information provided above is for the least restrictive products.

# Cold Rolled Sheet

## PRODUCT DESCRIPTION

### Products

This product is manufactured to meet a specific customer application. The product may be ordered to nominal or minimal thickness and is sold on an actual weight basis.

**Works Price Base Per 100 Pounds** Cold Rolled Sheet . . . . . Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Special Killed . . . . .	0.60
Drawing Steel Type B . . . . .	0.60
Deep Drawing Steel (DDS) . . . . .	1.50
Extra Deep Drawing Steel (EDDS) . . . . .	4.00
Extra Deep Drawing Steel Plus (EDDS+) . . . . .	4.25
Bake Hardenable (a)	
BH 180 . . . . .	2.05
BH 210 . . . . .	2.25
BH 250 . . . . .	2.50
Dent Resistant (a)	
DR 180/190 . . . . .	3.75
DR 210 . . . . .	4.00
Rephos/Renitrogenized . . . . .	1.25
JIS and EN Grades . . . . .	Inquire
Specified Hardness	
(Min., Max. or 15 Point Minimum Rockwell B Range) . . . . .	0.60
Full Hard (84 RB min) . . . . .	(0.75)
Specified Mechanical Properties . . . . .	1.25
Structural Steel	
Grade 25 (a) . . . . .	0.75
Grade 30 (a) . . . . .	0.75
Grade 33 (a) . . . . .	0.75
Grade 40 (a) . . . . .	1.15
Grade 50 (a) . . . . .	Inquire
High Strength Low Alloy Steel	
Grade 60 (a) . . . . .	7.00
Grade 50 (a) . . . . .	4.10
Grade 45 (a) . . . . .	4.00
Grade 40 (a) . . . . .	3.95
UHSS 120 ksi. min. yield . . . . .	8.25
*Cold Rolled Press Hardened Steel (PHS) . . . . .	Inquire

(a) Test reports are included in the extra.

\*Available as full hard and annealed.

## Chemistry Extras

See page 11.1 of the General Product Information Section.

## Size Extras

Specified Thickness (in.)		Master Coil Width (in.)		
NOM	MIN	24 to under 46	46 to under 64	64 & over
0.124 and heavier	0.121 and heavier	5.50	2.00	3.25
Under 0.124 - 0.0804	Under 0.121 - 0.0801	4.50	1.00	2.25
Under 0.0804 - 0.029	Under 0.0801 - 0.028	3.50	–	1.25
Under 0.029 - 0.025	Under 0.028 - 0.024	4.00	4.00	3.00
Under 0.025 - 0.021	Under 0.024 - 0.020	6.50	6.50	5.00
Under 0.021	Under 0.020	INQ	INQ	INQ

## Finish Extras

Matte . . . . .	None
Embossed (coined). . . . .	1.50
Grade E (exposed). . . . .	10.00

## Processing Extras

Refer to the Outside Processing section for slitting and cut lengths.

## General Extras

Refer to the General Pricing Information section for the following:  
inventory storage program, surface treatment extras, chemistry extras,  
item quantity, specified coil weight, test reporting, restricted tolerances,  
and packaging.

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## MIDDLETOWN MANUFACTURING LIMITS

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Specified Thickness (in.)		Coil Width (in.)			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.017 - 0.0183	0.0160 - 0.0174	50	–	–	50
0.0184 - 0.0227	0.0175 - 0.0199	60	50	50	60
0.0228 - 0.0251	0.0200 - 0.0209	64	60	50	64
0.0252 - 0.0302	0.0237 - 0.0287	76	60	50	76
0.0303 - 0.035	0.0288 - 0.0335	76	60	55	76
0.0351 - 0.0452	0.0336 - 0.0432	76	70	60	76
0.0453 - 0.0705	0.0433 - 0.0680	76	76	71	76
0.0706 - 0.090	0.0681 - 0.0875	76	66	64	76
0.0901 - 0.0995	0.0876 - 0.0970	76	66	64	76
0.0996 - 0.1141	0.0971 - 0.1111	76	66	64	76

24 in. I.D. only.

## ROCKPORT MANUFACTURING LIMITS

Specified Thickness (in.)		Coil Width (in.)				
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS	Ult Low C	Max CSA
0.015 - 0.0184	0.014 - 0.0174	INQ	INQ	INQ	INQ	INQ
0.0185 - 0.0239	0.0175 - 0.0224	66.00	INQ	54.00	60.00	1.34
0.024 - 0.0264	0.0225 - 0.0249	72.00	INQ	54.00	72.00	1.79
0.0265 - 0.0314	0.0250 - 0.0299	78.00	68.00	59.00	78.00	2.39
0.0315 - 0.0364	0.0300 - 0.0349	78.00	70.00	66.00	78.00	2.79
0.0365 - 0.0419	0.0350 - 0.0399	78.00	70.00	69.00	78.00	3.19
0.042 - 0.0469	0.0400 - 0.0449	78.00	70.00	69.00	78.00	3.59
0.047 - 0.0724	0.0450 - 0.0699	78.00	70.00	72.00	78.00	5.59
0.0725 - 0.0825	0.0700 - 0.0800	72.00	70.00	64.00	72.00	5.76
0.0825 - 0.138	0.0800 - 0.135	72.00	62.00	64.00	72.00	11.30

Cross Sectional Area (8' SA)

24 in. I.D. only.

HSLAS – inquire on gauges below 0.024 in. and over 0.100 in.

INQ on med C over 70 in. wide.

INQ on med C < 0.026 in. thick.

## DEARBORN MANUFACTURING LIMITS

Specified Thickness (in.)		Coil Width (in.)			
NOM	MIN	Low C	Strl Stl/ <sup>1</sup> Med C	HSLAS <sup>1</sup>	Ult Low C
0.0235 - 0.0294	0.022 - 0.0279	61	61	56	INQ
0.0295 - 0.0429	0.028 - 0.0409	61	61	58	61
0.043 - 0.105	0.041 - 0.102	61	61	61	61

24 in. I.D. only.

\*For CR full hard inquire for widths up to 72 in.

<sup>1</sup> Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered.  
The information provided above is for the least restrictive products.

# Enameling Steel

5

## PRODUCT DESCRIPTION

### Products

UNIVIT®, ASTM A424 Type 1, is melted to a specific chemistry and is specially processed to allow direct-on cover coat porcelain enameling without fear of carbon boiling or fishscaling.

VIT-PLUS®, ASTM A424 Type 2, is a controlled chemistry, nondecarburized, aluminum killed, enameling steel. It is suited for ground coat, ground coat + cover coat, and two coat-one fire enameling systems (wet or dry; pickle or pickle free).

I-F Enameling Steel, ASTM A424 Type 3, is a special enameling product that offers superior drawability and sag resistance, and because it is interstitial-free, it is non-aging and nonfluting. This product is suitable for ground coat porcelain enamel only.

UNIVIT, I-F Enameling Steel, and VIT-PLUS products will be sold on an actual weight basis only. The product may be ordered to nominal or to minimum thickness.

These products are described in ASTM A424.

### Works Price Base Per 100 Pounds

UNIVIT . . . . .	Inquire
VIT-PLUS . . . . .	Inquire
I-F Enameling Steel . . . . .	Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel . . . . .	None
Drawing Steel . . . . .	0.60

### Size Extras

Thickness (in.)		Master Coil Width (in.)		
NOM	MIN	24 to under 46	46 to under 64	64 & over
0.0635 and heavier	0.061 and heavier	3.50	–	1.25
Under 0.0635 - 0.029	Under 0.061 - 0.028	3.50	–	1.25
Under 0.029 - 0.025	Under 0.028 - 0.024	4.00	4.00	3.00
Under 0.025 - 0.021	Under 0.024 - 0.020	6.50	6.50	5.00
Under 0.021	Under 0.020	INQ	INQ	INQ



### Surface Treatment Extras

UNIVIT, VIT-PLUS and I-F Enameling Steel are furnished Dry or Oiled as specified by the customer.

Porcelain enameling grades are normally furnished with a slightly roughened surface which helps hold the slip while it dries for firing.

### General Extras

Refer to the General Pricing Information section for the following: inventory storage program, item quantity, specified coil weight, test reporting, restricted tolerances, and packaging.

### Test Reports

Test reports for UNIVIT contain ladle chemistry and do not reflect the carbon value after decarburization.

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## MIDDLETOWN AND ROCKPORT MANUFACTURING LIMITS

UNIVIT, I-F Enameling Steel, VIT-PLUS

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Specified Thickness (in.)		Coil Width (in.)			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.020 - 0.0221	0.0190 - 0.0213	62	–	–	60
0.0222 - 0.0246	0.0214 - 0.0238	66	–	–	72
0.0247 - 0.0694	0.0239 - 0.0681	72	–	–	78
0.0695 - 0.0843*	0.0682 - 0.0829	72	–	–	72

24 in. I.D. only, UNIVIT has potential for coil breaks in gauges of 0.060 and greater.

\*I-F only, if greater than 0.0843 please inquire.

# Aluminized Steel Type 1

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## PRODUCT DESCRIPTION

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### Products

Aluminized Steel Type 1 is a carbon sheet product coated with an aluminum-silicon alloy coating. It is produced by a continuous hot dip process. The aluminum-silicon alloy coating resists the destructive effects of exposure to combinations of heat and corrosion. Aluminized Steel Type 1 is ideal for applications involving temperatures up to 1250 °F and for moderately severe forming. This product, described in ASTM A463, is available in four coating weights T1 13, T1 25, T1 40, and T1 60. The approximate coating composition is 9% silicon, the balance aluminum. Aluminized Steel Type 1 has the surface characteristics of aluminum with the superior strength and lower cost of steel. It has a satiny, matte finish but is also available with an extra smooth (temper-rolled) finish where additional reflectivity or surface uniformity is desired. Aluminized Steel Type 1 sheet products will be sold on an actual weight basis only. The product may be ordered to nominal thickness (preferred) or to a minimum thickness. T125 or lighter is recommended to minimize flaking during difficult drawing or forming operations.

Drawing Quality High Temperature (DQHT) is an Aluminized Type 1 steel that exhibits superior resistance to the formation of brittle, dark-colored surface alloying at temperatures approaching 1000 °F. Conventional aluminum coated steel alloys at about 800 °F. This grade has formability characteristics approaching DDS and is subject to strain aging. Material should be processed within 45 days of shipment.

ULTRALUME Press Hardenable Steel (PHS) is another addition to our expanding product portfolio of Advanced High Strength Steels (AHSS). Aluminized Type 1 ULTRALUME PHS is intended for automotive steel applications where high strength, design flexibility and collision protection are paramount. Blanks produced from ULTRALUME PHS are heated in a furnace at 900 to 950 °C (1652 to 1742 °F) to bring the steel into the austenitic temperature range. The blank is then transferred to a hot forming press where the hot steel is formed into complex shapes. The steel cools rapidly inside the water-cooled dies and undergoes a phase transformation from austenite to a high strength phase – martensite. This rapid cooling, or quenching, increases the tensile strength of the steel from approximately 600 MPa up to 1,500 MPa. Since the steel is held in the dies during cooling, thermo-distortion and springback are avoided.

ULTRALUME PHS is continuously hot dip coated on both sides of the steel. The aluminum coating bath contains approximately 91% aluminum and 9% silicon. The metallic coating is metallurgically bonded to the steel substrate and protects the steel surface against decarburization and oxidation during hot stamping. As a result, the shot blasting operation required for hot-stamped, uncoated steel parts is eliminated.

ALUMI-THERM® Steel is an aluminized low alloy steel that has excellent mechanical properties at elevated temperatures. It is considerably stronger than low carbon aluminized at temperatures above 900 °F. It can be used in severe cyclic service up to 1400 °F and can perform well at higher temperatures in some applications.

**Works Price Base Per 100 Pounds** Aluminized Steel Type 1 . . . . . Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Forming Steel . . . . .	0.60
Deep Drawing Steel (DDS) . . . . .	2.25
Extra Deep Drawing Steel (EDDS) . . . . .	4.00
Extra Deep Drawing Steel Plus (EDDS+) . . . . .	4.25
Drawing Quality High Temperature (DQHT) . . . . .	5.10
ALUMI-THERM. . . . .	Inquire
ULTRALUME PHS . . . . .	Inquire
Specified Hardness (Min., Max., or 15 Point Minimum Rockwell B Range) . . . .	0.60
Specified Mechanical Properties . . . . .	1.25
Structural Steel (ASTM A463)	
Grade 33 (a) . . . . .	0.75
Grade 37 (a) . . . . .	0.85
Grade 40 (a) . . . . .	1.15
High Strength Low Alloy Steel	
Grade 45 (a) . . . . .	4.05
Grade 50 (a) (ASTM A463) . . . . .	4.10

(a) Test reports are included in the extra.

### Size Extras

Thickness and width extras for Aluminized Steel Type 1 are to be taken from the table below. After the thickness/width extra is established, the extras for the coating category ordered are to be added.

Thickness (in.)		Master Coil Width (in.)		
NOM	MIN	24 to under 30	30 to under 45	45 to 60
0.0625 and heavier	0.060 and heavier	3.00	2.50	–
Under 0.062 - 0.029	Under 0.060 - 0.028	3.50	2.50	–
Under 0.029 - 0.023	Under 0.028 - 0.022	4.00	3.00	2.50
Under 0.023 - 0.020	Under 0.022 - 0.019	6.50	5.50	5.00
Under 0.020 - 0.018	Under 0.019 - 0.017	8.00	7.00	6.50

## Coating Extras

Coating categories other than those shown are subject to inquiry. Extras shown include the total coating on both sides.

Thickness (in.)		Coating Extras						
oz./ft. <sup>2</sup> Min.		T1 13	T1 25	T1 26	T1 40	T1 47	T1 50	T1 60
TST Total Both Sides		0.13 (a)	0.25 (a)	0.26 (a)	0.40 (a)	0.47 (a)	0.50 (a)	0.60 (a)
NOM	MIN							
Under 0.134 and Heavier	0.130 and Heavier	1.05	1.45	1.50	1.90	2.23	2.15	2.35
To 0.134 - 0.120	Under 0.130 - 0.116	1.05	1.50	1.55	1.90	2.23	2.15	2.35
Under 0.120 - 0.105	Under 0.116 - 0.101	1.05	1.50	1.55	1.95	2.29	2.50	2.40
Under 0.105 - 0.087	Under 0.101 - 0.085	1.15	1.60	1.65	2.05	2.41	2.30	2.50
Under 0.087 - 0.077	Under 0.085 - 0.075	1.45	2.05	2.10	2.70	3.17	3.05	3.40
Under 0.077 - 0.062	Under 0.075 - 0.060	1.50	2.10	2.15	2.80	3.29	3.15	3.45
Under 0.062 - 0.054	Under 0.060 - 0.052	1.60	2.20	2.25	2.95	3.47	3.35	3.70
Under 0.054 - 0.046	Under 0.052 - 0.044	1.90	2.65	2.75	3.60	4.23	4.10	4.60
Under 0.046 - 0.037	Under 0.044 - 0.036	2.40	3.30	3.40	4.50	5.29	5.10	5.70
Under 0.037 - 0.033	Under 0.036 - 0.032	2.70	3.75	3.85	5.10	5.99	5.80	6.45
Under 0.033 - 0.029	Under 0.032 - 0.028	3.10	4.30	4.40	5.85	6.87	6.65	7.45
Under 0.029 - 0.026	Under 0.028 - 0.025	3.55	4.90	5.05	6.55	7.70	7.40	8.20
Under 0.026 - 0.023	Under 0.025 - 0.022	4.00	5.55	5.70	7.45	8.75	INQ	INQ
Under 0.023 - 0.021	Under 0.022 - 0.020	4.45	6.15	6.30	8.35	9.81	INQ	INQ
Under 0.021 - 0.020	Under 0.020 - 0.019	4.90	6.75	6.90	9.15	10.75	INQ	INQ
Under 0.020 - 0.019	Under 0.019 - 0.018	4.95	6.85	7.05	9.30	10.93	INQ	INQ
Under 0.019 - 0.018	Under 0.018 - 0.017	5.50	7.60	7.80	10.45	12.28	INQ	INQ

(a) No maximum limit.

## Finish Extra

EXTRASMOOTH . . . . . 1.50  
Inquire on orders when finish is EXTRASMOOTH and the surface treatment is dry.

## Surface Treatment Extras

Our standard practice includes the application of an oil and/or chemical treatment on Aluminized Steel Type 1 Sheet for protection from storage stain.

Standard Chemical Treatment  
CS, EDDS, and EDDS+. . . . . None  
DQHT and DDS (I-F Objective) . . . . . N/A  
EXTRASMOOTH/Temper Rolled . . . . . N/A

## Processing Extras

Refer to the Outside Processing section for dimensions not listed.

## General Extras

Refer to the General Pricing Information section for the following: inventory storage program, finish extras, chemistry extras, item quantity, specified coil weight, test reporting, restricted tolerances, and packaging.

## MIDDLETOWN MANUFACTURING LIMITS

Specified Thickness (in.)		Coil Width (in.)			
Nom. Gauge	Min. Gauge	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0170 - 0.0189	0.0150 - 0.0169	INQ	INQ	INQ	INQ
0.0190 - 0.0199	0.0170 - 0.0179	54	54	54	40
0.0200 - 0.0210	0.0180 - 0.0190	54	54	54	48
0.0211 - 0.0220	0.0191 - 0.0200	56	56	56	52
0.0221 - 0.0250	0.0201 - 0.0230	56	56	56	54
0.0251 - 0.0280	0.0231 - 0.0260	60	60	60	60
0.0281 - 0.0860	0.0261 - 0.0800	60	60	60	60
0.0861 - 0.0950	0.0801 - 0.0890	60	60	60	60
0.0951 - 0.1110	0.0891 - 0.1050	56.25	–	–	56.25
0.1111 - 0.1460	0.1051 - 0.1400	56.25	–	–	56.25

Cross Sectional Area (CSA) Limit: Max width = 5.70/gauge  
 24 in. I.D. only, maximum thickness to temper roll is 0.115 minimum or 0.119 nominal.

# Aluminized Steel Type 2

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## PRODUCT DESCRIPTION

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### Products

Aluminized Steel Type 2 is a carbon sheet steel with a coating of commercially pure aluminum. It is produced by the continuous hot dip process. The coating process creates a metallurgical bond between the coating and the steel base, and provides a uniform coating thickness of aluminum having a silvery, matte finish. Aluminized Steel Type 2 has the surface characteristics of aluminum and superior strength and lower cost of steel.

Aluminized Steel Type 2 is used for the fabrication of products.

Aluminized Steel Type 2, described in ASTM Standard A463, AASHTO M274, is available in T2® 65 and T2 100 coating weights.

**Works Price Base Per 100 Pounds**    Aluminized Steel Type 2 . . . . . Inquire

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## EXTRAS PER 100 POUNDS

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### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Specified Hardness	
(Min., Max. or 15 Point Minimum Rockwell B Range) . .	0.60
Specified Mechanical Properties . . . . .	1.25
Structural Steel ASTM A463	
Grade 33, 37 (a) . . . . .	Inquire
Grade 40 (a) . . . . .	Inquire
High Strength Low Alloy Steel	
Grade 45 (a) . . . . .	Inquire
Grade 50 ASTM A463 (a) . . . . .	Inquire

(a) Test reports are included in the extra.

## Size Extras

Thickness and width extras for Aluminized Steel Type 2 are to be taken from the table below. After the thickness and width extras are established, the extras for the coating category ordered are to be added.

Thickness (in.)		Master Coil Width (in.)		
NOM	MIN	24 to under 30	30 to under 45	45 to 60
0.0625 and heavier	0.060 and heavier	3.00	2.50	–
Under 0.062 - 0.029	Under 0.060 - 0.028	3.50	2.50	–

## Coating Extras

Extras for the coating weights listed apply to Type 2 hot dip commercially pure aluminum coating.

Thickness (in.)		Coating Extras	
oz./ft <sup>2</sup> Min. TST Total Both Sides		T2 65 0.65 (a)	T2 100 1.00 (a)
NOM	MIN		
0.134 & Heavier	0.130 & Heavier	1.05	2.05
Under 0.134 - 0.120	Under 0.130 - 0.116	1.65	2.55
Under 0.120 - 0.105	Under 0.116 - 0.101	1.90	3.25
Under 0.105 - 0.087	Under 0.101 - 0.085	2.20	3.90
Under 0.087 - 0.077	Under 0.085 - 0.075	2.80	4.80
Under 0.077 - 0.062	Under 0.075 - 0.060	3.30	5.05
Under 0.062 - 0.054	Under 0.060 - 0.052	4.20	6.30
Under 0.054 - 0.046	Under 0.052 - 0.044	4.65	8.40
Under 0.046 - 0.037	Under 0.044 - 0.036	5.85	10.60
Under 0.037 - 0.033	Under 0.036 - 0.032	6.85	12.30
Under 0.033 - 0.029	Under 0.032 - 0.028	INQ	INQ

Thickness ordering ranges are for pricing purposes only and are not to be used as tolerances.

(a) No maximum limits.

### Surface Treatment Extras

Our standard practice includes the application of an oil and/or chemical treatment on Aluminized Steel Type 2 Sheet for protection from storage stain.

### Processing

Refer to the Outside Processing section for dimensions not listed.

### General Extras

Refer to the General Pricing section for the following: inventory storage program, finish extras, surface treatment extras, specified coil weight, test reporting, restricted tolerances, and packaging.

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## MIDDLETOWN MANUFACTURING LIMITS

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Specified Thickness (in.)				Coil Width (in.)			
Nom. Gauge		Min. Gauge		Strl Stl/			
Min.	Max.	Min.	Max.	Low C	Med C	HSLAS	Ult Low C
0.0179 - 0.0280		0.0150 - 0.0260		INQ	INQ	INQ	INQ
0.0281 - 0.0860		0.0261 - 0.0800		60	60	60	60
0.0861 - 0.0950		0.0801 - 0.0890		60	60	60	60
0.0951 - 0.1110		0.0891 - 0.1050		56.25	–	–	56.25
0.1111 - 0.1460		0.1051 - 0.1400		56.25	–	–	56.25

Cross Sectional Area (CSA) Limit: Max width = 5.70/gauge  
24 in. I.D. only



## PRODUCT DESCRIPTION

### Products

ZINCGRIP® Steel is a carbon steel sheet product with a zinc coating applied by passing the steel through a bath of molten zinc by a continuous hot dip process. Minimized Spangle is ZINCGRIP that through control of the coating bath chemistry has no visible spangle. It is available in the full range of coating weights and base metal qualities. It is used in noncritical surface applications and is not guaranteed to be free from stretcher stain, luder lines, or fluting. EXTRASMOOTH™ is a product that is produced by skin passing the coated sheet with a small amount of reduction in thickness to smooth the surface and impart resistance to stretcher strain and fluting. It is especially suited for applications where appearance is important either as painted or unpainted. ZINCGRIP ULTRASMOOTH® is a product with surface appearance, uniformity, and consistency of quality that is superior to Extra Smooth. Applications would be the more stringent surface quality requirements. These coatings provide galvanic, as well as barrier protection. The product is available in a variety of coating weights and surface finishes and is described in ASTM A653.

ZINCGRIP Steel products will be sold on an actual weight basis only. The product may be ordered to nominal thickness or to minimum thickness.

### Works Price Base

**Per 100 Pounds** ZINCGRIP Galvanized . . . . . Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Specified Hardness . . . . .	0.60
Forming Steel	
Type A . . . . .	1.50
Type B . . . . .	0.60
(+) Boron (HR base only) . . . . .	1.10
Deep Drawing Steel (DDS) . . . . .	2.25
Extra Deep Drawing Steel (EDDS) . . . . .	4.00
Extra Deep Drawing Steel Plus (EDDS+) . . . . .	4.25
Bake Hardenable (a)	
BH 180 . . . . .	2.55
BH 210 . . . . .	2.75
BH 240/250 . . . . .	3.00
Dent Resistant (a)	
DR 180/190 . . . . .	3.75
DR 210 . . . . .	4.00
Dual Phase 590/600/780/800/980 (a) . . . . .	INQ
Structural Steel	
Grade 33 (a) . . . . .	0.75
Grade 37 (a) . . . . .	0.85
Grade 40 (a) . . . . .	1.15
Grade 50 class 1 (a) . . . . .	1.35
Grade 50 class 2 (a) . . . . .	1.20
Grade 80 (a) . . . . .	Inquire
High Strength Low Alloy Steels	
Grade 40 (a) . . . . .	3.95
Grade 45 (a) . . . . .	4.05
Grade 50 (a) . . . . .	4.10
Grade 55 (a) . . . . .	Inquire
Grade 60 (a) . . . . .	Inquire
Grade 70 XF (HR substrate only) (a) . . . . .	Inquire
Grade 80 XF (HR substrate only) (a) . . . . .	Inquire
UHSS 120 ksi. min. yield (a) . . . . .	Inquire
(a) Test reports are included in the extra.	
(b) For HSLAS-F grades add 1.00 to HSLAS Extra	

## Size Extras

Thickness (in.)		Master Coil Width (in.)			
NOM	MIN	24 to under 46	46 to under 64	64 to 72	over 72
0.124 & Heavier	0.121 & Heavier	5.50	2.00	3.25	4.25
Under 0.124 - 0.0804	Under 0.121 - 0.0801	4.50	1.00	3.25	4.25
Under 0.0804 - 0.029	Under 0.0801 - 0.028	3.50	–	1.25	2.25
Under 0.029 - 0.025	Under 0.028 - 0.024	4.00	4.00	3.00	4.00
Under 0.025 - 0.021	Under 0.024 - 0.020	6.50	6.50	5.00	INQ
Under 0.021	Under 0.020	INQ	INQ	INQ	INQ

## Coating Extras

Product included in these categories is typically ordered in grams/square meter and the coating weight is typically specified on a per-side basis. For example, a 60G/60G coating category requires a minimum of 60 g/m<sup>2</sup> SST on each surface. Although the coating weight is specified on a per-side basis, our standard product is coated on both surfaces. The first number in the coating weight designates the unexposed side. The second number in the coating weight designates the exposed side. Standard practice unless requested is to supply coils prime side out.

Extras for coating categories apply to hot dipped zinc type coatings.  
**Extras shown include the total coating on both sides.**

Use this table for galvanized products when coatings are designated as g/m<sup>2</sup> Coating weights other than those specified are subject to inquiry for availability. However, the extra for the next higher category will apply.

### Specified to other than ASTM A653 Coating Designation\*

Master Coil Width (in.)									
g/m <sup>2</sup>		20G/	40G/	50G/	60G/	70G/	90G/	98G/	
MIN SST per side		20G	40G	50G	60G	70G	90G	98G	
NOM	MIN								
0.134 & Heavier	0.130 & Heavier	2.20	2.20	2.20	2.25	2.50	2.80	2.90	
Under 0.134 thru 0.087	Under 0.130 thru 0.085	2.35	2.35	2.35	2.70	2.90	3.25	3.30	
Under 0.087 thru 0.062	Under 0.085 thru 0.060	2.90	2.90	2.90	3.10	3.55	4.05	4.15	
Under 0.062 thru 0.046	Under 0.060 thru 0.044	3.40	3.40	3.40	3.70	4.25	5.00	5.15	
Under 0.046 thru 0.037	Under 0.044 thru 0.036	3.85	3.85	3.85	4.35	5.00	5.75	6.20	
Under 0.037 thru 0.033	Under 0.036 thru 0.032	4.25	4.25	4.25	4.85	5.60	6.50	6.95	
Under 0.033 thru 0.029	Under 0.032 thru 0.028	4.75	4.75	4.75	5.35	6.05	7.25	7.65	
Under 0.029 thru 0.026	Under 0.028 thru 0.025	5.05	5.05	5.05	5.75	6.75	7.95	8.40	
Under 0.026 thru 0.023	Under 0.025 thru 0.022	5.60	5.60	5.60	6.35	7.35	8.90	9.40	
Under 0.023 thru 0.021	Under 0.022 thru 0.020	6.05	6.05	6.05	6.95	8.10	9.60	10.20	
Under 0.021 thru 0.019	Under 0.020 thru 0.018	–	–	–	–	–	10.50	11.20	
Under 0.019 thru 0.018	Under 0.018 thru 0.017	–	–	–	–	–	11.50	12.40	

Price range of ABOVE \$1.10 up to and INCLUDING \$1.30 per pound LME average settlement price.  
Restricted coating weight distribution extra is included in this Table.

\*Extra pricing may vary, subject to current market pricing.

Extras for the coating weights listed apply to hot dipped, two-side coatings. Coating categories other than those specified, including differential coatings, are subject to inquiry. **Extras shown include the total coating on both sides.**

Specified to ASTM A653 Coating Designation only\*

Thickness (in.)		Coating Extras					
oz./ft² Min.		G01	G30	G40	G60	G90	
MIN TST total both sides		No Min.	0.30	0.40	0.60	0.90	
NOM	MIN						
0.134 & Heavier	0.130 & Heavier	0.85	0.85	0.85	1.15	1.65	
Under 0.134 thru 0.087	Under 0.130 thru 0.085	1.35	1.35	1.35	1.90	2.70	
Under 0.087 thru 0.062	Under 0.085 thru 0.060	1.65	1.65	1.65	2.60	3.65	
Under 0.062 thru 0.046	Under 0.060 thru 0.044	2.35	2.35	2.35	3.40	5.00	
Under 0.046 thru 0.037	Under 0.044 thru 0.036	2.90	2.90	2.90	4.25	6.20	
Under 0.037 thru 0.033	Under 0.036 thru 0.032	3.25	3.25	3.25	4.75	6.80	
Under 0.033 thru 0.029	Under 0.032 thru 0.028	3.70	3.70	3.70	5.45	7.85	
Under 0.029 thru 0.026	Under 0.028 thru 0.025	4.25	4.25	4.25	6.05	8.80	
Under 0.026 thru 0.023	Under 0.025 thru 0.022	4.75	4.75	4.75	6.80	9.90	
Under 0.023 thru 0.021	Under 0.022 thru 0.020	5.30	5.30	5.30	7.55	10.95	
Under 0.021 thru 0.019	Under 0.020 thru 0.018	–	5.75	5.75	8.40	12.20	
Under 0.019 thru 0.018	Under 0.018 thru 0.017	–	6.75	6.75	9.40	13.75	
		<b>G115</b>	<b>G140</b>	<b>G165</b>	<b>G185</b>	<b>G210</b>	<b>G235</b>
		<b>1.15</b>	<b>1.40</b>	<b>1.65</b>	<b>1.85</b>	<b>2.10</b>	<b>2.35</b>
0.134 & Heavier	0.130 & Heavier	2.20	3.05	3.55	4.05	4.50	4.95
Under 0.134 thru 0.087	Under 0.130 thru 0.085	3.30	4.60	5.45	6.25	6.90	7.75
Under 0.087 thru 0.062	Under 0.085 thru 0.060	4.65	6.50	7.75	8.65	9.95	10.85
Under 0.062 thru 0.046	Under 0.060 thru 0.044	6.35	8.90	10.45	11.85	13.20	14.90
Under 0.046 thru 0.037	Under 0.044 thru 0.036	7.80	10.85	12.80	13.85	16.20	–
Under 0.037 thru 0.033	Under 0.036 thru 0.032	8.70	12.15	15.15	16.30	18.20	–
Under 0.033 thru 0.029	Under 0.032 thru 0.028	10.05	14.00	16.75	18.70	–	–
Under 0.029 thru 0.026	Under 0.028 thru 0.025	11.20	15.55	–	–	–	–
Under 0.026 thru 0.023	Under 0.025 thru 0.022	12.70	16.90	–	–	–	–
Under 0.023 thru 0.021	Under 0.022 thru 0.020	14.00	19.50	–	–	–	–
Under 0.021 thru 0.019	Under 0.020 thru 0.018	–	–	–	–	–	–
Under 0.019 thru 0.018	Under 0.018 thru 0.017	–	–	–	–	–	–

Price range of ABOVE \$1.10 up to and INCLUDING \$1.30 per pound LME average settlement price.

\*Extra pricing may vary, subject to current market pricing.

#### Specific Coating Weight Distribution

(UL Requirement) only available for G30, G40, G60, G90 . . . . 0.50

For orders specified to ASTM A653 Coating Category, the minimum triple-spot average coating weight on any one side shall not be less than 40% of the single-spot requirement. When the coating weight is required to meet a specified minimum on a per-side basis including differential coating weight requirements, the above extra is applicable. (This includes Underwriters Laboratory requirements.)

## Finish Extras

ULTRASMOOTH . . . . .	Inquire
EXTRASMOOTH . . . . .	1.50
EMBOSS . . . . .	Inquire
Minimum Spangle . . . . .	None
Inquire on orders when finish is EXTRASMOOTH or ULTRASMOOTH and the surface treatment is dry.	

The product must be ordered ULTRASMOOTH or EXTRASMOOTH to prevent strain or fluting in subsequent operations. In CS material, the effect of Temper Rolling is temporary due to the phenomenon commonly known as aging. EXTRASMOOTH is recommended for coil coated applications.

## Surface Treatment Extras

We recommend the application of an oil or chemical treatment to help protect against storage stain. Material that is to be subsequently painted should not be ordered "Chem Treated" unless suitable paint pretreatments are employed.

Chem Treated . . . . .	None
Chem Treated (RoHs Compliant) . . . . .	Inquire
PAINTGRIP . . . . .	3.00

EXTRASMOOTH and ULTRASMOOTH, with Chemtreat or Prelube cannot be ordered at thicknesses greater than 0.080 in.

Coating Line Capabilities			
	Middletown	Rockport	Dearborn
Chem Treated	Yes	Yes	Yes
Chem Treat — (EXTRASMOOTH, ULTRASMOOTH, DDS)	No	Yes	Yes
PAINTGRIP — MS	Yes	No	No
PAINTGRIP — (EXTRASMOOTH, ULTRASMOOTH, DDS)	No	No	No

Cross Sectional Area (CSA) Limit: Max width = 5.70/gauge  
24 in. I.D. only, maximum thickness to temper roll is 0.125 minimum or 0.129 nominal.

## General Extras

Refer to the General Pricing Section for the following: inventory and storage program, chemistry extras (including specified chemistry), item quantity, specific coil weight, test reporting, restricted tolerances, and packaging.

## Chemistry Extras

See page 11.1 of the General Product Information Section.

## MIDDLETOWN MANUFACTURING LIMITS

### Middletown Works ZINCGRIP GI Minimized Spangle Non Temper Rolled

Specified Thickness (in.)		Coil Width (in.)			
Nom. Gauge Min.	Min. Gauge Max.	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0219 - 0.0235	0.0211 - 0.0226	72	50	–	72
0.0236 - 0.0260	0.0227 - 0.0251	72	60	52	72
0.0261 - 0.0310	0.0252 - 0.0299	72	66	55	72
0.0311 - 0.0359	0.0300 - 0.0348	74	70	55	74
0.0360 - 0.0461	0.0349 - 0.0448	74	70	60	74
0.0462 - 0.0710	0.0449 - 0.0695	74	70	64	74
0.0711 - 0.0891	0.0696 - 0.0869	74	66	66	74
0.0892 - 0.0910	0.0870 - 0.0881	72	66	66	72
0.0911 - 0.0977	0.0882 - 0.0948	72	66	64	72
0.0978 - 0.1012	0.0949 - 0.0983	72	66	64	72
0.1013 - 0.1212	0.0984 - 0.1183	66	60	60	66
0.1213 - 0.1304	0.1184 - 0.1275	62	60	60	62
0.1305 - 0.1338	0.1276 - 0.1316	62	60	–	62

PAINTGRIP inquire for gauge < 0.030 in.

### Middletown Works ZINCGRIP GI ULTRASMOOTH & EXTRASMOOTH

Specified Thickness (in.)		Coil Width (in.)			
Nom. Gauge Min.	Min. Gauge Max.	Low C	Strl Stl/ Med C	HSLAS	Ult Low
0.0221 - 0.0235	0.0212 - 0.0226	72	50	–	72
0.0236 - 0.0258	0.0227 - 0.0248	72	60	55	72
0.0259 - 0.0306	0.0249 - 0.0296	72	66	55	72
0.0307 - 0.0353	0.0297 - 0.0342	73	70	55	73
0.0354 - 0.0455	0.0343 - 0.0442	73	70	60	73
0.0456 - 0.0705	0.0443 - 0.0692	73	70	64	73
0.0706 - 0.0879	0.0693 - 0.0859	73	66	66	73
0.0880 - 0.0909	0.0860 - 0.0883	72	66	66	72
0.0910 - 0.0981	0.0884 - 0.0955	72	66	64	72
0.0982 - 0.0991	0.0956 - 0.0967	72	66	64	72
0.0992 - 0.1192	0.0968 - 0.1167	66	60	60	66
0.1193 - 0.1243	0.1168 - 0.1218	62	60	60	62

## DEARBORN MANUFACTURING LIMITS

### Dearborn Works ZINCGRIP Minimized Spangle, EXTRASMOOTH and ULTRASMOOTH

Specified Thickness (in.)		Coil Width (in.) Maximum			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS <sup>1</sup>	Ult Low C
0.027 - 0.105	0.025 - 0.102	61.5	61.5	61.5	72

24 in. I.D. only.

Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered.  
The information provided above is for the least restrictive products.

### ZINCGRIP GI Spartan

Specified Thickness (in.)		Coil Width (in.) Maximum			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS <sup>1</sup>	Ult Low C
0.0195 - 0.0234	0.018 - 0.0219	INQ	INQ	–	–
0.0235 - 0.084	0.012 - 0.085	61.625	61.625	61.625	61.625

Subject to CSA Maximum of 4.2 in.<sup>2</sup>

Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered.  
The information provided above is for the least restrictive products.

### ZINCGRIP GI HR Substrate (Outside coating)

Specified Thickness (in.)		Coil Width (in.) Maximum		
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS <sup>1</sup>
0.076 - 0.0849	0.071 - 0.0799	60	60	56
0.085 - 0.1659	0.080 - 0.1599	60	60	60
0.166 - 0.257	0.160 - 0.250	INQ	INQ	INQ

Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered.  
The information provided above is for the least restrictive products.

## ROCKPORT MANUFACTURING LIMITS

### Rockport Works ZINCGRIP GI, Minimized Spangler, and EXTRASMOOTH

Specified Thickness (in.)		Coil Width (in.)			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0190 - 0.0215	0.018 - 0.020	54	–	–	49
0.0216 - 0.0244	0.0201 - 0.0224	60	–	–	54
0.0245 - 0.0269	0.0225 - 0.0249	68	–	–	61
0.027 - 0.0319	0.025 - 0.0299	75	60	60	68
0.032 - 0.0419	0.030 - 0.0399	80	70	70	80
0.042 - 0.0724	0.040 - 0.0699	80	76	76	80
0.073 - 0.082	0.070 - 0.078	76	76	76	80

Inquire for availability on orders 77 – 80 in. wide.

Inquire for availability on orders 40 – 45 in. wide.

# Galvanized Culvert Sheets

## PRODUCT DESCRIPTION

### Products

Galvanized Culvert Sheet products will be sold on an actual weight basis only. The product may be ordered to nominal or minimum thickness.

### Works Price Base Per 100 Pounds

Galvanized Sheet Flat Culvert. . . . . Inquire

## EXTRAS PER 100 POUNDS

Width and thickness extras for AK Steel Galvanized Culvert Sheet products are to be taken from the table of Width/Thickness Extra shown below. After the width thickness extra is established, the extras for the galvanized coating from the next table are to be added.

### Size Extras

Thickness (in.)		Width (in.)	
NOM	MIN	24 to under 46	46 to 60
0.064 - 0.129	0.061 - 0.129	3.50	0
Under 0.064 - 0.046	Under 0.061 - 0.044	3.50	0

### Coating Extras

The following table of extras includes the extra for 2.00 ounces per square foot coating by the triple spot test in accordance with American Association of State Highway Transportation Officials Specification (AASHTO). Extras shown include total coating both sides.

#### ZINCGRIP® Culvert Specified to AASHTO Coating Designation

Thickness (in.)		Coating Extras
NOM	MIN	Ordered Coating Category oz./ft² 2.00
0.137	0.129	3.65
0.109	0.101	5.50
0.079	0.072	7.70
0.064	0.057	9.70
0.052	0.046	13.25

Price range of ABOVE \$1.10 up to and INCLUDING \$1.30 per pound LME average settlement price.



## Specifications

AASHTO General Requirement:

Weight of Coating – 2.00 oz./ft.<sup>2</sup> Total Both Sides (Triple Spot Test)

Mechanical Requirements (minimum)

Tensile Strength – 45 ksi.

Yield Strength – 33 ksi.

Elongation – 20%

Steel Chemical Composition (1)

Sulphur, max. . . . . 0.05%

Sum of Carbon, Manganese, Phosphorus, Silicon, and

Sulphur, max. . . . . 0.70%

(1) The requirement for copper has been deleted from AASHTO Specification.

## Tolerances

The dimensional tolerances for AK Steel Galvanized Culvert Sheet are the same as for ZINCGRIP Galvanized Sheet.

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## MIDDLETOWN MANUFACTURING LIMITS

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Standard Thickness (in.)		Maximum Width (in.)
NOM	MIN	
0.137	0.129	60
0.109	0.101	60
0.079	0.072	60
0.064	0.057	60
0.052	0.046	60

\*Inquire for availability > 60 in. wide and any quality ordered other than CSP or CS Type B.

# ZINCGRIP® Galvannealed Steel

## PRODUCT DESCRIPTION

### Products

ZINCGRIP® Galvannealed Steel is a carbon steel sheet product continuously coated on both sides with a Zinc-Iron alloy coating. It is not spangled and is normally dull gray in appearance. Minimized Spangle is ZINCGRIP GA that through control of the coating bath chemistry has no visible spangle. It is available in the full range of coating weights and base metal qualities. It is used in noncritical surface applications and is not guaranteed to be free from stretcher stain, luder lines, or fluting. ZINCGRIP GA EXTRASMOOTH is a product that is produced by skin passing the coated sheet with a small amount of reduction in thickness to smooth the surface and impart resistance to stretcher strain and fluting. It is especially suited for applications where appearance is important either as painted or unpainted. ZINCGRIP GA ULTRASMOOTH is a product that has been produced by a process that supplies a product with surface appearance, uniformity, and consistency of quality that is superior to EXTRASMOOTH. The product is used in applications where more stringent surface quality requirements are needed. These coatings provide galvanic, as well as barrier protection. The product is available in a variety of coating weights and surface finishes and is described in ASTM A653.

ZINCGRIP Galvannealed Steel products will be sold on an actual weight basis only. The product may be ordered to nominal or minimum thickness.

### Works Price Base Per 100 Pounds

ZINCGRIP Galvannealed . . . . . Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Forming Steel	
Type A . . . . .	1.50
Type B . . . . .	0.60
Deep Drawing Steel (DDS) . . . . .	2.25
Extra Deep Drawing Steel (EDDS) . . . . .	4.00
Extra Deep Drawing Steel Plus (EDDS+) . . . . .	4.25
Bake Hardenable	
BH 180 . . . . .	Inquire
BH 210 . . . . .	Inquire
BH 240/250 . . . . .	Inquire
Dent Resistant (a)	
DR 180/190 . . . . .	3.75
DR 210 . . . . .	4.00
Dual Phase 590/600/780/800/980 (a) . . . . .	Inquire
Structural Steel	
Grade 33 (a) . . . . .	0.75
Grade 37 (a) . . . . .	0.85
Grade 40 (a) . . . . .	1.15
Grade 50 class 1 (a) . . . . .	1.35
Grade 50 class 2 (a) . . . . .	1.20
High Strength Low Alloy Steel	
Grade 40 (a) (b) . . . . .	3.95
Grade 45 (a) (b) . . . . .	4.05
Grade 50 (a) (b) . . . . .	4.10
Grade 60 (a) (b) . . . . .	Inquire
Grade 70 XF (HR substrate only) (a) (b) . . . . .	Inquire
Grade 80 XF (HR substrate only) (a) (b) . . . . .	Inquire

(a) Test reports are included in the extra.

(b) If HSLAS-F 1.00 to HSLA

## Size Extras

Thickness (in.)		Master Coil Width (in.)			
NOM	MIN	24 to under 46	46 to under 64	64 to 72	Over 72
0.124 & Heavier	0.121 & Heavier	5.50	2.00	3.25	4.25
Under 0.124 - 0.0804	Under 0.121 - 0.0801	4.50	1.00	3.25	4.25
Under 0.0804 - 0.029	Under 0.0801 - 0.028	3.50	1.25	2.25	–
Under 0.029 - 0.025	Under 0.028 - 0.024	4.00	4.00	3.00	4.00
Under 0.025 - 0.021	Under 0.024 - 0.020	6.50	6.50	5.00	INQ
Under 0.021	Under 0.020	INQ	INQ	INQ	INQ

## Coating Extras

Product included in these categories is typically ordered in grams/square meter and the coating weight is typically specified on a per-side basis. For example, a 60A/60A coating category requires a minimum of 60 g/m<sup>2</sup> SST on each surface. Although the coating weight is specified on a per-side basis, our standard product is coated on both surfaces. The first number in the coating weight designates the unexposed side. The second number in the coating weight designates the exposed side. Standard practice unless requested is to supply coils prime side out.

Extras for coating categories apply to hot dipped zinc type coatings.  
**Extras shown include the total coating on both sides.**

Use this table for galvanized products when coatings are designated as g/m<sup>2</sup>. Coating weights other than those specified are subject to inquiry for availability. However, the extra for the next higher category will apply.

### Specified to other than ASTM A653 Coating Designation

Thickness (in.)		Coating Extras			
g/m <sup>2</sup>		20A/	40A/	45A/	60A/
MIN SST (Single Spot Test) per side		20A	40A	45A	60A
NOM	MIN				
0.134 & Heavier	0.130 & Heavier	2.20	2.20	2.20	2.25
Under 0.134 thru 0.087	Under 0.130 thru 0.085	2.35	2.35	2.35	2.70
Under 0.087 thru 0.062	Under 0.085 thru 0.060	2.90	2.90	2.90	3.10
Under 0.062 thru 0.046	Under 0.060 thru 0.044	3.40	3.40	3.40	3.70
Under 0.046 thru 0.037	Under 0.044 thru 0.036	3.85	3.85	3.85	4.35
Under 0.037 thru 0.033	Under 0.036 thru 0.032	4.25	4.25	4.25	4.85
Under 0.033 thru 0.029	Under 0.032 thru 0.028	4.75	4.75	4.75	5.35
Under 0.029 thru 0.026	Under 0.028 thru 0.025	5.05	5.05	5.05	5.75
Under 0.026 thru 0.023	Under 0.025 thru 0.022	5.60	5.60	5.60	6.35
Under 0.023 thru 0.021	Under 0.022 thru 0.020	6.05	6.05	6.05	6.95
Under 0.021 thru 0.019	Under 0.020 thru 0.018	6.50	6.50	6.50	7.55
Under 0.019 thru 0.018	Under 0.018 thru 0.017	7.10	7.10	7.10	8.30

Price range of ABOVE \$1.10 up to and INCLUDING \$1.30 per pound LME average settlement price.  
Restricted cooling weight distribution extra is included in this table.

Extras for the coating weights listed apply to hot dipped, two-side coatings. Coating categories other than those specified, including differential coatings, are subject to inquiry. **Extras shown include the total coating on both sides.**

**Specified to ASTM A653 Coating Designation only**

Thickness (in.)		Coating Extras—Extras apply to each separately			
oz./ft. <sup>2</sup> Min.		A01	A25	A40	A60
MIN TST (Triple Spot Test) total both sides		No Min.	0.25	0.40	0.60
NOM	MIN				
0.134 & Heavier	0.130 & Heavier	0.85	0.85	0.85	1.23
Under 0.134 thru 0.087	Under 0.130 thru 0.085	1.35	1.35	1.35	1.96
Under 0.087 thru 0.062	Under 0.085 thru 0.060	1.65	1.65	1.65	2.39
Under 0.062 thru 0.046	Under 0.060 thru 0.044	2.35	2.35	2.35	3.41
Under 0.046 thru 0.037	Under 0.044 thru 0.036	2.90	2.90	2.90	4.21
Under 0.037 thru 0.033	Under 0.036 thru 0.032	3.25	3.25	3.25	4.71
Under 0.033 thru 0.029	Under 0.032 thru 0.028	3.70	3.70	3.70	5.37
Under 0.029 thru 0.026	Under 0.028 thru 0.025	4.25	4.25	4.25	6.16
Under 0.026 thru 0.023	Under 0.025 thru 0.022	4.75	4.75	4.75	6.89
Under 0.023 thru 0.021	Under 0.022 thru 0.020	5.30	5.30	5.30	7.69
Under 0.021 thru 0.019	Under 0.020 thru 0.018	–	5.75	5.75	INQ
Under 0.019 thru 0.018	Under 0.018 thru 0.017	–	6.75	6.75	INQ

Price range of ABOVE \$1.10 up to and INCLUDING \$1.30 per pound LME average settlement price.

**Specific Coating Weight Distribution**

(UL Requirement) only available for A425, A40, and A60 . . . 0.50

For orders specified to ASTM A653 Coating Category, the minimum triple-spot average coating weight on any one side shall not be less than 40% of the single-spot requirement. When the coating weight is required to meet a specified minimum on a per-side basis including differential coating weight requirements, the above extra is applicable. (This includes Underwriters Laboratory requirements.)

**Finish Extras**

ULTRASMOOTH . . . . .	Inquire
EXTRASMOOTH . . . . .	1.50
Min Spangle . . . . .	None

The product must be ordered ULTRASMOOTH or EXTRASMOOTH to prevent fluting or strain in subsequent operations. In CS material, the effect of Temper Rolling is temporary due to the phenomenon commonly known as aging. EXTRASMOOTH is recommended for coil coated applications.

**Surface Treatment Extras**

We recommend the application of an oil to help protect against storage stain.

Pre-Phosphated Galvanneal . . . . .	0.90
Chem Treat . . . . .	None
Chem Treat (RoHS Compliant). . . . .	Inquire

**General Extras**

Refer to the General Pricing Section for the following: inventory and storage program, chemistry extras (including specified chemistry), item quantity, specific coil weight, test reporting, restricted tolerances, and packaging.

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## ROCKPORT MANUFACTURING LIMITS

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### Rockport Galvanneal

Specified Thickness (in.)		Coil Width (in.)			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS	Ult Low C
0.0245 - 0.0269	0.023 - 0.0249	64	–	–	64
0.027 - 0.0319	0.025 - 0.0299	75	–	–	68
0.032 - 0.0419	0.030 - 0.0399	80	70	70	80
0.042 - 0.0729	0.040 - 0.0699	80	76	76	80
0.073 - 0.080	*0.070 - 0.0765	76	76	76	76

\* 0.078 in. is the max gauge for HSLAS.

\* Inquire for availability on orders 77 - 80 in. wide.

\* Inquire for availability on orders 40 - 45 in. wide.

## DEARBORN MANUFACTURING LIMITS

### Dearborn Works ZINCGRIP GI & GA HDGL

Specified Thickness (in.)		Coil Width (in.) Maximum			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS <sup>1</sup>	Ult Low C
0.027 - 0.106	0.025 - 0.102	61.5	61.5	61.5	72

Subject to CSA Maximum of 5.74 in<sup>2</sup>

Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered. The information provided above is for the least restrictive products.

24 in. ID only

34 in. minimum width

### ZINCGRIP GA Spartan

Specified Thickness (in.)		Coil Width (in.) Maximum			
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS <sup>1</sup>	Ult Low C
0.0195 - 0.0234	0.018 - 0.0219	INQ	INQ	–	–
0.0235 - 0.084	0.022 - 0.067	60	60	60	60

Subject to CSA Maximum of 4.2 in<sup>2</sup>

Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered. The information provided above is for the least restrictive products.

24 in. ID only

28 in. minimum width

### ZINCGRIP GA HR Substrate (Outside coating)

Specified Thickness (in.)		Coil Width (in.) Maximum		
NOM	MIN	Low C	Strl Stl/ Med C	HSLAS <sup>1</sup>
0.076 - 0.0849	0.071 - 0.0799	60	60	56
0.085 - 0.1659	0.080 - 0.1599	60	60	60
0.166 - 0.257	0.160 - 0.250	INQ	INQ	INQ

Subject to CSA Maximum of 10.0 in<sup>2</sup>

Structural and HSLA steels are gauge and width restrictive depending on the strength level ordered. The information provided above is for the least restrictive products.

24 in. ID only

30 in. minimum width

# ZINCGRIP® ELECTRASMOOTH® Steel

10

## PRODUCT DESCRIPTION

### Products

ZINCGRIP® ELECTRASMOOTH® Steel is a carbon sheet product coated with an electrolytically deposited coating of zinc. The product is available in a variety of coating weights depending upon the protection desired. ZINCGRIP ELECTRASMOOTH Sheet products will be sold on an actual coating weight basis only. The product may be ordered to nominal or minimum thickness. The product is described in ASTM A879, ASTM A917, ASTM A1008 and ASTM A568.

**Works Price Base Per 100 Pounds** ZINCGRIP ELECTRASMOOTH Galvanized. . . . . Inquire

## EXTRAS PER 100 POUNDS

### Quality Extras

Commercial Steel Type A, Type B and Type C . . . . .	None
Drawing Steel Type B . . . . .	0.60
Extra Deep Drawing Steel (EDDS) . . . . .	4.00
Extra Deep Drawing Steel Plus (EDDS+) . . . . .	4.25
Specified Hardness	
(Min., Max. or 15 Point Minimum Rockwell B Range) . . . . .	0.60
Specified Mechanical Properties . . . . .	Inquire
Bake Hardenable (a)	
BH 180 . . . . .	2.05
BH 210 . . . . .	2.25
BH 240/250 . . . . .	2.50
Dent Resistant (a)	
DR 180/190 . . . . .	3.75
DR 210 . . . . .	4.00
High Strength	
Low Alloy Steel Grade 40 (a) . . . . .	3.95
High Strength	
Low Alloy Steel Grade 50 ASTM A1008 (a) . . . . .	4.10

(a) Test reports are included in the extra.

## Size Extras

Thickness and width extras for ZINCGRIP ELECTRASMOOTH Steel products are to be taken from the table below. After the width and thickness extra is established, the extras for the Zinc coating from the appropriate coating category table are to be added.

Thickness (in.)		Master Coil Width (in.)			
NOM	MIN	24 to under 46	46 to under 64	64 to 72	Over 72
0.0635 & Heavier	0.061 & Heavier	INQ	INQ	INQ	INQ
Under 0.0635 - 0.029	Under 0.061 - 0.028	3.50	1.25	INQ	–
Under 0.029 - 0.025	Under 0.028 - 0.024	4.00	4.00	3.00	INQ
Under 0.025 - 0.021	Under 0.024 - 0.020	6.50	6.50	5.00	INQ
Under 0.021	Under 0.020	INQ	INQ	INQ	INQ

## Coating Extras

Specified to ASTM A879 Coating Designation

Extras for the coating weights listed apply to zinc coatings. Electrolytic coatings are to be specified in grams/square meter for each side.

The first number in the coating weight designates the unexposed side.

The second number in the coating weight designates the exposed side.

Standard practice unless requested is to supply coils prime side out.

Coating weights other than those specified are subject to inquiry for availability. However, the extra for the next higher category will apply.

Thickness (in.)		Coating Extras — Extras apply to each side separately							
g/m <sup>2</sup> SST per side		20G MIN	30G MIN	40G MIN	50G MIN	60G MIN	70G MIN	90G MIN	98G MIN
NOM	MIN								
0.062 & Heavier	0.060 & Heavier	INQ	INQ	INQ	INQ	INQ	INQ	INQ	INQ
Under 0.062 thru 0.046	Under 0.060 thru 0.044	1.75	1.75	1.75	1.75	2.05	2.35	3.10	3.55
Under 0.046 thru 0.037	Under 0.044 thru 0.036	2.05	2.05	2.05	2.05	2.35	2.80	3.55	3.85
Under 0.037 thru 0.033	Under 0.036 thru 0.032	2.35	2.35	2.35	2.35	2.80	3.10	3.85	4.15
Under 0.033 thru 0.029	Under 0.032 thru 0.028	2.80	2.80	2.80	2.80	3.10	3.55	4.15	4.55
Under 0.029 thru 0.026	Under 0.028 thru 0.025	3.10	3.10	3.10	3.10	3.55	3.85	4.55	4.85
Under 0.026 thru 0.024	Under 0.025 thru 0.023	3.55	3.55	3.55	3.55	3.85	4.15	4.85	5.15
Under 0.024 thru 0.020	Under 0.023 thru 0.019	3.70	3.70	3.70	3.70	4.05	4.35	5.05	5.35

Price range of ABOVE \$1.10 up to and INCLUDING \$1.30 per pound LME average settlement price.

Weights other than those specified are subject to inquiry for availability; however, the extra for the next higher coating weight will apply.

## Finish Extras

Grade E (exposed). . . . . 10.00  
HSLAS grade 50 not available as exposed.

## Processing Extras

Refer to the Outside Processing section for dimensions not listed.

## General Extras

Refer to the General Pricing Information section for the following:  
inventory extras, surface treatment extras, chemistry extras (including specified chemistry), item quantity, specified coil weight, test reporting, restricted tolerances, and packaging.



## MIDDLETOWN MANUFACTURING LIMITS

### ELECTROGALVANIZED

Specified Thickness (in.)				Coil Width (in.)			
Nom. Gauge		Min. Gauge		Strl Stl/ HSLAS			
MIN	MAX	MIN	MAX	Low C	Med C	Ult Low	
0.018	0.0225	0.017	0.0217	60	60	50	50
0.0226	0.0240	0.0218	0.0229	63	60	50	63
0.0241	0.0253	0.0230	0.0239	64	60	60	64
0.0254	0.0303	0.0240	0.0292	72	60	60	75
0.0304	0.0354	0.0293	0.0341	75	60	60	75
0.0355	0.0450	0.0342	0.0436	75	70	60	75
0.0451	0.0630	0.0437	0.0616	75	75	71	75
0.0631*	0.0700	0.0617*	0.0686	CSA (max. 75)	CSA (max. 66)	CSA (max. 64)	CSA (max. 75)
0.0701*	0.080	0.0687*	0.080	CSA (max. 68)	CSA (max. 66)	CSA (max. 64)	CSA (max. 68)

Cross Sectional Area (CSA) Limit: Max = 5.46

Inquire on 2 side heavy weight coatings (90G/90G, 98G/98G and 98G/90G)

\* Inquire for availability

# General Pricing Information

## EXTRAS PER 100 POUNDS

These general extras apply to prices not found in the specific product pricing sections.

### Inventory Storage Program

Note: In those cases where the costs associated with a specific program are different than AK Steel's published extra, we reserve the right to charge an extra that would be equal to the actual costs of the Inventory/Storage program.

Customer Inventory or Storage Program . . . . . 1.00

### Finish Extras

Exposed Grade E. . . . . 10.00

### Surface Treatment Extras

Our standard practice includes the application of an oil and/or chemical treatment for protection from storage stain/rust.

Oil (type not specified). . . . . None  
Standard Chemical Treatment. . . . . None  
Prelube Coating (conventional type) . . . . . 0.60

### Specified Coil Weight

400 lbs./in. of width and over . . . . . None  
Under 400 thru 200 lbs./in. of width . . . . . 2.00  
Under 200 lbs./in. of width . . . . . 3.00

### Order Quantity

Single Slab Extra. . . . . 1.25

### Chemistry Extras

AISI-SAE Grade:

When ordering the standard SAE chemistry of

1010, 1012, 1015 . . . . . 0.50  
1006, 1008. . . . . Inquire

Specified Chemistry:

When specifications for carbon and/or manganese indicate maximums only, with the limits of carbon 0.08% thru 0.18% and/or manganese 0.45% thru 0.60% . . . . . Inquire

For other association grades, chemistry range restrictions or customer specified chemistry, the following chemistry extras apply.

Maximum of Carbon Range	Maximum of Manganese Range		
	thru 0.60	0.61 thru 0.90	0.91 thru 1.15
Specified less than 0.04	0.50	–	–
0.04 - 0.10	0.25	0.40	0.60
0.11 - 0.20	0.40	0.50	0.60
0.21 - 0.25	0.75	1.00	1.15

#### Carbon Sheet Steel Compositions per ASTM A568\*\*

SAE No.	Heat Chemical Composition Limits, %			
	Carbon	Manganese	Phosphorus	Sulfur
1006	0.08 max.	0.45 max.	0.030	0.035
1008	0.10 max.	0.50 max.	0.030	0.035
1009	0.15 max.	0.60 max.	0.030	0.035
1010	0.08 - 0.13	0.30 - 0.60	0.030	0.035
1012	0.10 - 0.15	0.30 - 0.60	0.030	0.035
1015	0.13 - 0.18	0.30 - 0.60	0.030	0.035
1016	0.13 - 0.18	0.60 - 0.90	0.030	0.035
1017	0.15 - 0.20	0.30 - 0.60	0.030	0.035
1018	0.15 - 0.20	0.60 - 0.90	0.030	0.035
1019	0.15 - 0.20	0.70 - 1.00	0.030	0.035
1020	0.18 - 0.23	0.30 - 0.60	0.030	0.035
1021	0.18 - 0.23	0.60 - 0.90	0.030	0.035
1022	0.18 - 0.23	0.70 - 1.00	0.030	0.035
1023	0.20 - 0.25	0.30 - 0.60	0.030	0.035
1026	0.22 - 0.28	0.60 - 0.90	0.030	0.035
1035	0.32 - 0.38	0.60 - 0.90	0.030	0.035
10B38*	0.35 - 0.42	0.60 - 0.90	0.030	0.035
1050	0.48 - 0.55	0.60 - 0.90	0.030	0.035
1053	0.48 - 0.55	0.70 - 1.00	0.030	0.035
1070	0.65 - 0.75	0.60 - 0.90	0.030	0.035
1074	0.70 - 0.80	0.50 - 0.80	0.030	0.035
1075	0.70 - 0.80	0.40 - 0.70	0.030	0.035

Although the maximum amounts of phosphorus and sulfur are 0.030% and 0.035% respectively, our normal practice produces significantly lower levels for both elements.

\*B 0.0005 - 0.003

\*\*Inquire for grades not listed

Carbon and Manganese	
For more restricted than standard SAE (see SAE Table on page 3.3) . . . . .	Inquire
Phosphorus	
When a range is specified or required . . . . .	0.50
When restricted to less than 0.025% max. . . . .	0.50
Copper	
When specified, or for any minimum through 0.20% . . . . .	0.50
Sulfur	
When specified or required (includes resulfurized grades). . . . .	0.40
When restricted to less than 0.015% to 0.009% . . . . .	0.50
When restricted to less than 0.009% . . . . .	1.00

For specified chemistries or chemistry tolerances other than shown,  
please contact your AK Steel Sales Representative.

## Test Reporting

Standard Ladle Analysis	
One ladle analysis per heat of steel can be supplied on the corresponding AK Steel Invoice, shipping notice, and certification . . . . .	None
Standard Test Reporting	
When the reporting of test data is for specification compliance, standard test reports include mechanical properties, hardness tests, and coating weight tests . . . . .	0.25
Special Test Reporting	
When non-standard testing and/or customized reports are required . . . . .	1.00

## Restricted Tolerances

When thickness, width, length, or flatness tolerances are specified or  
required closer than standard, such tolerances will be considered on the  
basis of our ability to produce. Assessment of appropriate extras will be  
determined by analyzing the added scrap loss, labor, and machine time  
necessary to accomplish.

Restricted Gauge Tolerance . . . . .	2.25
Reference tables on pages 2.8 and 2.9 for standard AK Steel gauge tolerances.	
Restricted Width Tolerance	
Please contact your AK Steel Sales Representative	
Special Flatness Requirement	
(Tension levelling – includes cropping to thickness) . . . . .	3.25

## Packaging

The ordered item weight determines the extra if the buyer does not  
specify a package weight less than the ordered item weight. In the latter  
case, the specified smaller package weight will determine the extra.

Standard Packaging as described in the General Product Information section.	
Coils or Cut Lengths 15,000 lbs. and over . . . . .	None
Coils or Cut Lengths under 15,000 lbs. and over. . . . .	10.00/unit

## Non-Standard Packaging

Packaging Type	Coils	Cut Lengths
	Dollars/Unit	Dollars/Unit
Paper – Additional Layer	8.00	8.00
Bands – Each Extra Band	5.00	5.00
Skeleton Platforms	25.00	25.00
Skids – Each	10.00	10.00
Plastic Inside Diameter Ring	20.00	
Steel Inside Diameter Ring	20.00	
Metal Protective Sheets or Waster Sheets	15.00	
Fiberboard		
– Inside Diameter Ring	9.00	
– Outside Diameter Ring	18.00	
– Outside Wrap	20.00	
– Donut	6.00	
– Protective Sheets (shock paper)	20.00	
Fiber Core Inserts	10.00	
Special Protective Devices – Bumper Blocks, etc.	10.00	10.00

### Special Protective Package – Contact your AK Steel Sales Representative

P537	44.00/Unit
P538	64.00/Unit
P539	58.00/Unit
P546	20.00/Unit
P547	64.00/Unit
P548	20.00/Unit
P549	20.00/Unit
P554	90.00/Unit
P555	20.00/Unit
P557	64.00/Unit
P558	20.00/Unit

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## SERVICES

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AK Steel can provide the following services through selected quality processors: Edge Trimming, Shearing, Levelling, Painting, Welding, Slitting, Blanking, Pickling, and Tension Levelling. Please talk to your AK Steel representative to learn about all coating options.

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## PROCESSING

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### Single Billing for Ease of Control

Customers' administration costs are kept to a minimum because the customer only makes one phone call and gets only one invoice for the steel that is needed. Timely and accurate data of order status can be electronically transmitted to you, our customer.

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## HOW TO ORDER

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For further information on how these services can work for you, please contact your local AK Steel Sales Representative or call our Customer Service Center toll-free number 844.783.3599.

### Tolerances

Gauge tolerance for a slit width coil is equal to the published AK Steel gauge tolerance associated with the master coil. Other tolerances are dependent upon processor capabilities.

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## QUALITY SYSTEMS

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We value you, our customer, and your expectation of a quality product. To maintain our high standards and your quality expectations, we align all processors to our quality systems and continuously monitor to ensure ultimate satisfaction.

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## PRICING

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Due to wide variety in all products and processing requirements, please inquire on all services on the following pages. Extras are based on product, sizes and additional options.

## Hot Rolled Sheet

### Definition:

Processing is an extra applied to the Hot Rolled Processed Sheet base price. Slit coil process extras, expressed as thickness and width extras in the following table, include all processing costs associated with slitting mill-produced wide coils to the customer's specified width, including the cut edge extra.

For inquiries on thickness and width limits, please contact your AK Steel representative.

### Pickled (Oiled or Dry):

The following Pickle processing extras include all processing costs associated with pickling mill produced coils at an authorized processor when the product required is beyond our mill producing capabilities, or when a customer specifies or requires an outside processor to be used. In addition, strength and temperature are also services available to our customers.

### Carbon — thru 0.25% Max., High Strength and ASTM/ASME A414

Thickness (in.)		Mill Edge	Cut Edge
NOM	MIN		
0.180 and over	0.172 and over	INQ	INQ
Under 0.180 - 0.076	Under 0.172 - 0.071	INQ	INQ

For Carbon over 0.25% add \$0.25/cwt to the above extras.

**Dry Lube and Mill Bond** (excluding pickling charge) . . . . . Inquire

### Cut-To-Length:

Extras to be added to the price of coils — 24 in. and wider.

For inquiries on length limits, please contact your AK Steel representative.

**Cold Rolled Sheet,  
Coated Carbon Sheet**  
(Aluminized, HDG, EG, GA)

**Definition:**

Processing is an extra applied to the Cold Rolled Sheet base price. Slit coil processing extras, expressed as thickness and width extras in the following table, include all processing costs associated with slitting mill produced wide coils to the customer's specified width. If a product needs stencil, please call your AK Steel representative to get cost of additional charge.

**Thickness and Width**

Thickness (in.)		Slit Width (in.)	
NOM	MIN	3 to under 12	12 to under 24
0.0635 and Heavier	0.061 and Heavier	5.50	4.00
Under 0.0635 - 0.029	Under 0.061 - 0.028	5.50	4.00
Under 0.029 - 0.025	Under 0.028 - 0.024	5.50	4.50
Under 0.025 - 0.021	Under 0.024 - 0.020	7.00	6.50
Under 0.021	Under 0.020	INQ	INQ

These extras include the master coil thickness and width extra.

**Cut-To-Length:** (Excludes Developed Blanks, Parallelograms, Trapezoids)  
Extras to be added to the price of coils — 24 in. and wider.

Developed or Laser Blanking: AK Steel must have specific drawing and specifications for pricing.

For inquiries on thickness and length limits, please contact your AK Steel representative.



## **Prepainted Sheet**

### **Pricing:**

AK Steel Prepainted Sheet products are priced on an individual inquiry basis because of the wide variety of substrate and paint coating combinations. Pricing is based on actual weight, and includes the substrate base price, appropriate extras, freight costs to toll coater, and coater painting costs. Prepainted is sold F.O.B. coil coater.

## **Developed Blanks**

Due to the unique requirements of special blanks and non uniform cut-to-length sizes, all inquiries for these shapes must be individually quoted. AK Steel must have specific drawings and specifications, including tolerances, in order to build up the blank weights and pricing for these items.

If you need additional information, please contact your AK Steel representative.

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## Glossary

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**Aging** Changes in mechanical properties that occur over time in low carbon steel causing the material to become stronger, less ductile and prone to strain.

**Annealing** A process involving high-temperature heating and cooling of the as-rolled cold rolled steel substrate to make it softer and more formable.

**Camber** The deviation of a side edge from a straight line, the measurement being taken on the concave side with a straight edge.

**Carbon Steel** Steel which owes its properties chiefly to carbon without substantial amounts of other alloying elements; also known as straight carbon steel or plain carbon steel. The maximum content for the following elements does not exceed the percentages noted: manganese 1.65, silicon 0.60, copper 0.60.

**Cast Analysis** (heat analysis) Chemical analysis representative of a specific heat of steel. (Ladle analysis is a deprecated term that is replaced by cast analysis.)

**Chemical Treatment** A passivating treatment applied to metallic coated products to retard formation of corrosion products (storage stain/rust).

**Coil Breaks** Creases or ridges in sheet that appear as parallel lines across the direction of rolling, and that generally extend the full width of the sheet or strip.

**Cold-Rolled Sheet** This is manufactured from hot-rolled descaled coils by cold reducing to the desired thickness, generally followed by annealing to recrystallize the grain structure. Cold-rolled sheet is manufactured from hot-rolled coils over 24 in. in width.

**Cold-Rolled Strip** This product is furnished in widths of 24 in. and narrower with specific temper, specific edge or specific finish to closer tolerances than cold-rolled carbon steel sheet.

**Continuous Casting** A casting technique in which a slab is continuously withdrawn through the bottom of the mold as it solidifies.

**Conversion Coating** The chemical treatment film applied to the steel or metallic coated sheet prior to painting.

**Corrosion** Gradual chemical or electrochemical attack on a metal by atmospheric moisture or other agents.

**Crown** The thickness increases from an edge measurement to the center of a sheet.

**Cut Edge** Removes the hot mill edge. Coil ends will be cropped back to gauge when cut edge is ordered.

**Cut To Length** Ordered when specific or discrete lengths are desired.

**Deep Drawing** An extreme condition of drawing. The term “deep drawing” is commonly used to describe metal stamping operations which are a combination of drawing and severe stretching.

**Drawing** The shaping of a flat blank into a desired contour by causing the metal to flow over a draw ring and around a punch.

**Ductility** The ability to be deformed plastically without fracture. In flat rolled steel, ductility is measured by mechanical properties in a tensile test.

**Elongation** The percent increase of a given distance (usually 2 in.) prior to fracture during tensile testing.

**Embossed Sheet** A sheet having a prominent, impressed texture or pattern on its surface(s). If the defined texture is applied to one surface only, it is most properly termed a coined surface. AK produces coined steel only.

**Extra Smooth Sheet** Product produced to sheet by temper rolling after coating to smooth the surface and impart resistance to stretcher strain.

**Flatness** Flatness is a measure of maximum deviation from a flat horizontal surface.

**Hardness** Resistance of metal to penetration of the surface.

**Inclusions** Non-metallic materials (such as oxides, sulfides or silicates) in steel as cast.

**Inclusion Shape Control** The use of Rare Earth Metals or Calcium alloys to control the morphology of inclusions, in order to provide improved properties and formability for select applications.

**Killed Steel** Steel deoxidized by silicon or aluminum to reduce the oxygen content in the molten steel to a minimum prior to solidification of the metal.

**Leveling** Flattening of rolled sheet by reducing or eliminating distortions.

**Lüders Lines** (stretcher strain) Irregular surface markings or depressions caused by localized plastic deformation resulting from yield point elongation.

**Matte Finish** The surface roughness produced on sheet by temper rolling with textured work, generally defined as 20 – 80 microinches.

**Mechanical Properties** The properties of a material that reveal its elastic and plastic behavior when force is applied, for example yield strength, tensile strength, elongation, etc.

**Mil** A term used to indicate thickness of 0.001 in.

**Minimized Spangle** The crystal structure produced on galvanized sheet by either treating the coated sheet during solidification of the zinc or by control of coating bath chemistry.

**Oiling** Application of a suitable rust-preventive oil to flat rolled steel to retard rusting during shipment and storage. Although the oil is intended as a corrosion inhibitor only, in some instances it may also serve as a lubricant for subsequent fabricating operations.

**Pickling** Removing surface oxides from metals by a chemical reaction.

**Phosphatized** Chemical treatment in a phosphate solution of metallic coated sheet to prepare the surface for painting.

**Prelubricant** A lubricant applied to the sheet at the mill to enhance formability.

**Product Analysis** The chemical analysis of the finished steel.

**Roll Forming** The fabrication process of deforming the metal sheet by passing it through a consecutive series of rolls.

**Salt Spray Test** A moisture and corrosion resistance test employing a controlled exposure of a sheet to a fog or mist of a salt solution for a specified period of time.

**Slitting** The cutting of sheet stock coils to produce narrower widths.

**T-Bend 0-, 1-, 2-, etc,** A mechanical operation wherein a sheet sample is bent back upon itself with the inside bend radius specified in terms of the sheet thicknesses. Thus a 2-T Bend is a bend with an inside radius two times the sheet thickness of the metal sheet being tested.

**Temper Rolling** A light cold reduction of the sheet steel. This operation is performed to improve flatness, eliminate fluting and stretch strain, and impart the desired surface finish.

**Tensile Strength** In tensile testing, the ratio of maximum load to original cross sectional area. Also called Ultimate Strength.

**Tension Leveling** An operation in which sheet steel in coil form is stretched beyond its yield point to provide a sheet with superior flatness characteristics.

**Tolerance** Allowed limits of deviation from a specification.

**White Rust** The corrosion product (zinc hydroxide, etc.) that forms when galvanized sheet gets wet and is unable to dry.

**Yield Point** The load per unit of original cross-section area at which a marked increase in the deformation of the specimen occurs without increase of load.

**Yield Point Elongation** (also called Discontinuous Yielding) The non-uniform plastic flow of a metal exhibiting a yield point in which plastic deformation is inhomogeneously distributed.

**Yield Strength** The stress required to give the initial plastic (permanent) deformation, at which a material exhibits a specified deviation from proportionality of stress and strain. An offset of 0.2% is used for many metals.

# MAKING INNOVATION HAPPEN

SAFETY | QUALITY | PRODUCTIVITY | INNOVATION



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AK Steel is a leading producer of flat-rolled carbon, stainless and electrical steel products, primarily for the automotive, infrastructure and manufacturing, including electrical power, and distributors and converters markets. Through its subsidiaries, the company also provides customer solutions with carbon and stainless steel tubing products, die design and tooling, and hot- and cold-stamped components. Headquartered in West Chester, Ohio (Greater Cincinnati), the company has approximately 9,500 employees at manufacturing operations in the United States, Canada and Mexico, and facilities in Western Europe. Additional information about AK Steel is available at [www.aksteel.com](http://www.aksteel.com).

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