



# High Strength Steels

## Grade Availability

ArcelorMittal offers the automotive industry a family of HI FORM (HF) high-strength steels with yield strength grades ranging from 250 to 550 MPa and tensile strength grades from 340 to 590 MPa.

### Yield Strength Grades

Yield Strength	Hot Rolled	Cold Rolled			
	Uncoated	Uncoated	EG	HDGI	HDGA
250 MPa	-	Yes	Yes	Yes	-
300 MPa	Yes	Yes	Yes	-	-
350 MPa	Yes	Yes	Yes	Yes	Yes
400 MPa	-	Yes	Yes	Yes	Yes
480, 500 MPa	-	Yes	Yes	-	-
550 MPa	-	Yes	Yes	-	-

### Tensile Strength Grades

Tensile Strength	Hot Rolled	Cold Rolled			
	Uncoated	Uncoated	EG	HDGI	HDGA
340 MPa	-	Yes	Yes	-	Yes
370 MPa	-	Yes	Yes	-	-
390 MPa	-	Yes	Yes	-	Yes
440 MPa	-	Yes	Yes	-	Yes
590 MPa	Dev	Yes	-	-	Yes

EG: Electrogalvanized  
 HDGI: Hot-Dip-Galvanized  
 HDGA: Hot-Dip-Galvannealed  
 Yes: Products Commercially Available

Dev: Products are under development or in limited production.  
**Please inquire about the status and availability of these products.**

### Product Characteristics

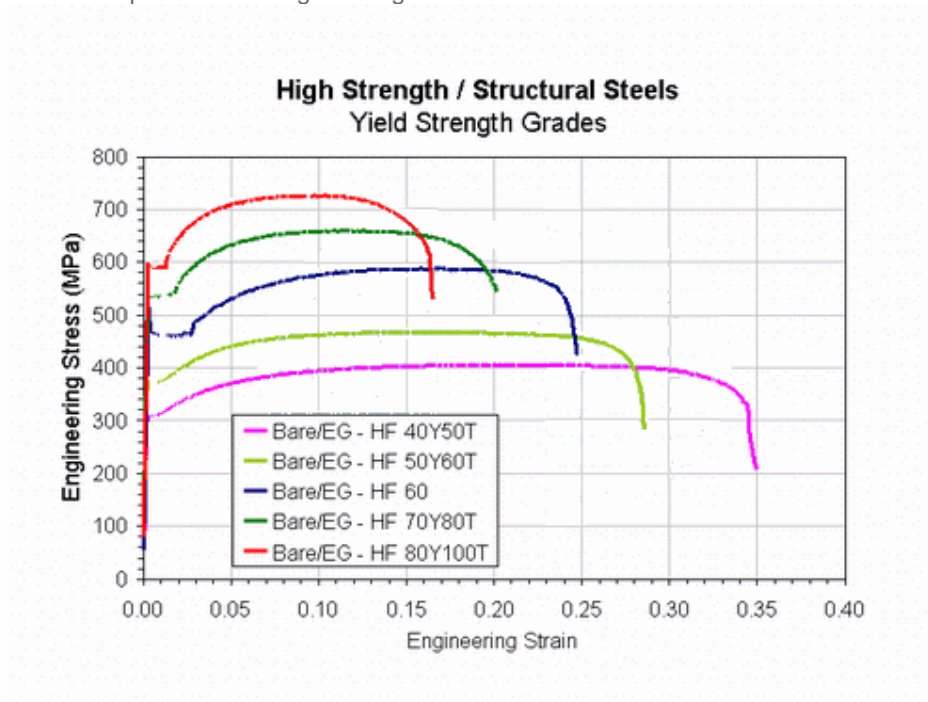
High strength steels are mainly used for structural applications and are hence also called structural steels. They can be produced with or without addition of small amount of microalloying elements. High strength low alloy steels, commonly referred to as HSLA steels, are produced using microalloying elements like Cb, Ti, Mo, V etc. Due to the low-carbon and low-alloy content, these grades offer sufficiently good formability at the strength levels and have good weldability.

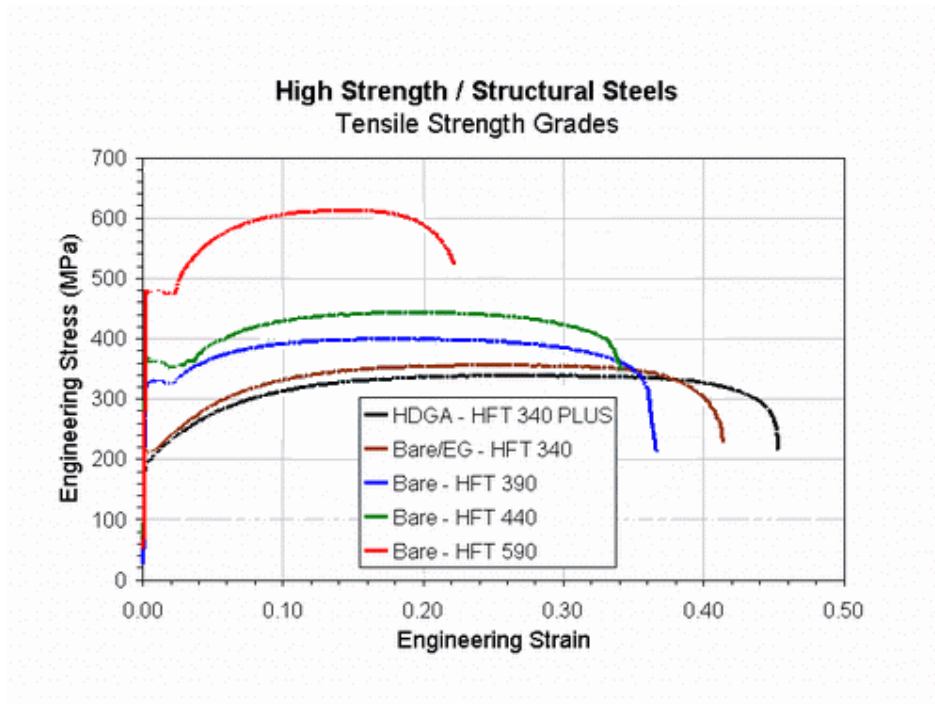
Under development is a hot rolled 590 MPa tensile strength stretch flanging grade (HFT 590 SF) that will offer high hole expansions necessary for various automotive structural and chassis parts.

### Application

High strength steels are extensively used in automotive body structure where good durability is a requirement. Complex shapes can be more difficult to form than with mild steels, but good die design and analysis can result in successful parts. Typical applications include rocker-panels and reinforcements, pillar inners and reinforcements, various cross-car beams and members, rails.

Representative High Strength / Structural Steel Stress-Strain Curves





## High Strength -240 and 250 MPa YS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled		Cold Rolled		
Uncoated	Uncoated	EG	HDGI	HDGA
-	HFY 250	HFY 250	HFY 255	-
-	HF 40Y50T	HF 40Y50T	HF 40	-
-	-	-	-	SS 35

EG: Electrogalvanized  
 HDGI: Hot-Dip-Galvanized  
 HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers various high strength steels at the 250 MPa yield strength level with different coating conditions. Several 40 ksi (~275 MPa) grades are also available. These grades are part of ArcelorMittal's HI FORM (HF) family of steels. A structural steel (SS) is also offered at the 240 MPa strength level.

### Application

These grades are used in in automotive body structures, reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

## Chemistry

Product	Chemistry
HFY 250	Low carbon steels containing Mn for strengthening
HFY 255	
HF 40Y50T	
HF 40	
SS 35	

## Processing

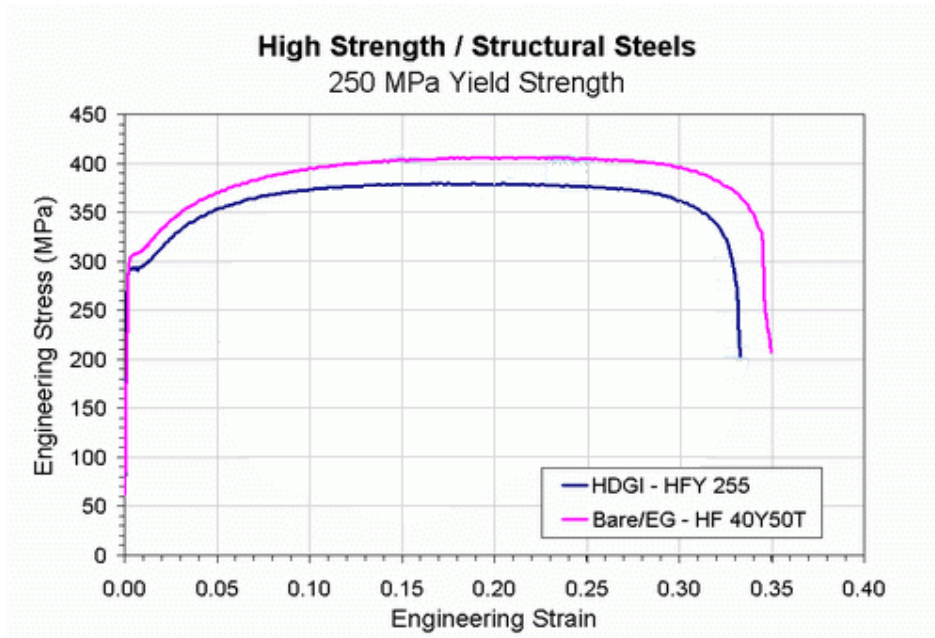
High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced product is then further processed using continuously annealing technology.

## Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare/EG	HFY 250	280	405	34	1.1	0.18
Bare/EG	HF 40Y50T	294	412	35	1.1	0.18
HDGI	HFY 255	312	396	33	1.0	0.17
HDGI	HF 40	318	412	33	1.0	0.17
HDGA	SS 35	290	386	36	1.0	0.17

<sup>1</sup> The strain range for n-value is 10-20%

Representative Stress-Strain Curves



Stress-Strain curve data is available upon request

## High Strength - 300 MPa YS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled		Cold Rolled		
Uncoated	Uncoated	EG	HDGI	HDGA
HFY 310	HFY 300	HFY 300	-	-

EG: Electrogalvanized  
 HDGI: Hot-Dip-Galvanized  
 HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers hot rolled and cold rolled high strength steels at the 300 MPa yield strength level with different coating conditions. A hot rolled 310 MPa grade is available. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

### Application

These grades are used in automotive body structures, reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

## Chemistry

Product	Chemistry
HFY 300	Low carbon steels strengthened with Mn and P.
HFY 310	

## Processing

High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn) and phosphorous (P). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced products are then further processed using continuously annealing technology.

## Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFY 300	324	448	33	1.0	0.18

<sup>1</sup> The strain range for n-value is 10-20%

## High Strength - 340 MPa TS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
-	HFT 340	HFT 340	-	-
-	-	-	-	HFT 340 PLUS

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers several cold rolled high strength steels at the 340 MPa tensile strength level with different coating conditions. These grades are part of ArcelorMittal's HI FORM (HF) family of steels. The 'PLUS' grades are steels that offer enhanced formability at the strength level.

### Application

These grades are suitable for exposed quality applications. Typical applications of these products are where dent resistant is required in the panel, such as automotive outer-body panels.

These grades can also be used for various structural reinforcements.

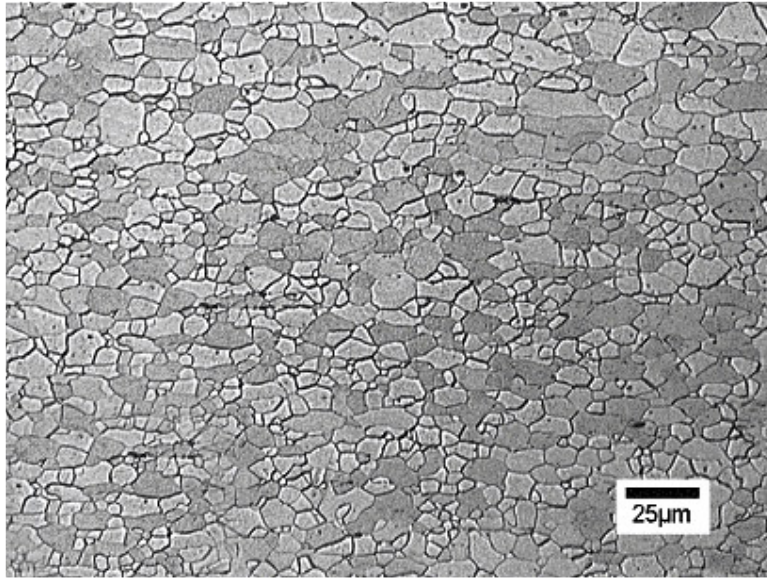
### Chemistry

Product	Chemistry
HFT 340	Low carbon grade, containing Mn and P
HFT 340 PLUS	Vacuum degassed ultra-low carbon steel containing Mn, P, Ti and Nb

### Processing

Depending on the grade, these High Strength Steels are produced using vacuum degassed ultra-low-carbon or regular low-carbon compositions strengthened with the appropriate alloying elements. Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced products is then further processed using batch annealing or continuously annealing technology. HFT 340 is batch annealed and is available as uncoated or electrogalvanized (EG). HFT 340 PLUS is in-line continuously annealed and is available as hot-dip-galvannealed (HDGA).

### Typical Microstructure



HDGA-HFT 340 PLUS contains fine grained ferrite

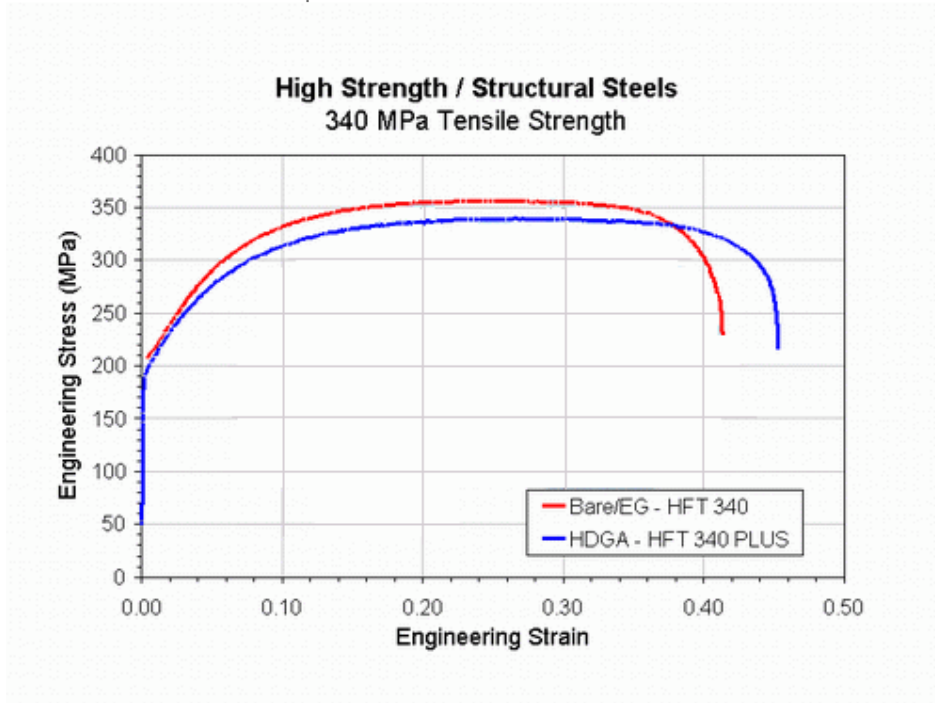
### Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFT 340	224	368	38	1.6	0.20
HDGA	HFT 340 PLUS	190	361	40	1.3	0.22

<sup>1</sup> The strain range for n-value is 10-20%



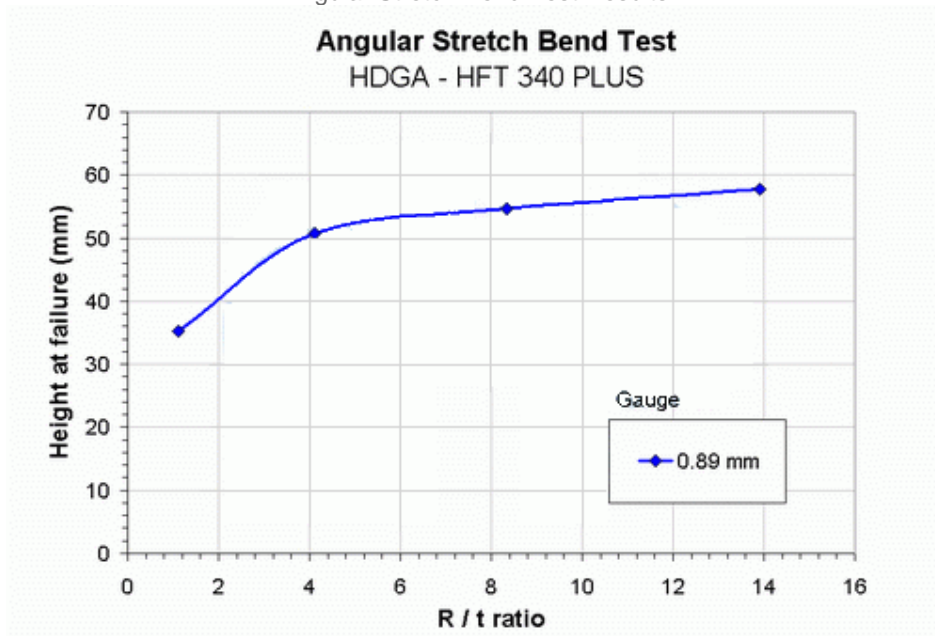
## Representative Stress-Strain Curves



Stress-Strain curve data is available upon request.

## Formability Behavior

### Angular Stretch Bend Test Results



Sheared Edge Stretching Test Results

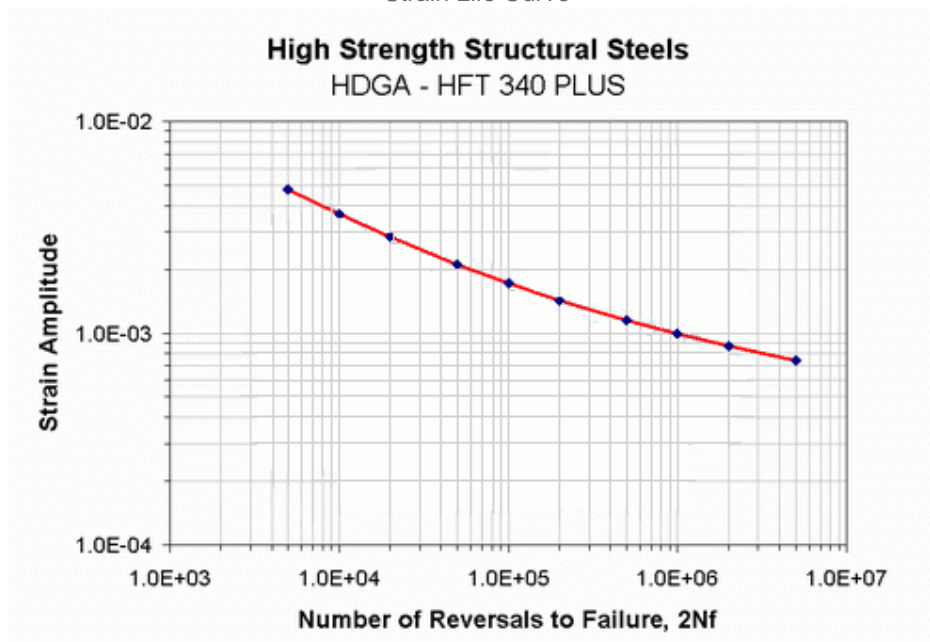
Product	Gauge (mm)	Average Hole Expansion (%)
HDGA-HFT 340 PLUS	0.89	159.2

**Fatigue**

Strain Life Parameters

Fatigue Strength Coefficient (MPa)	726
Fatigue Ductility Coefficient	0.271
Fatigue Strength Exponent	-0.111
Fatigue Ductility Exponent	-0.515
Cyclic Strength Coefficient (MPa)	838
Cyclic Strain Hardening Exponent	0.198

Strain Life Curve



## High Strength - 350 MPa YS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
-	HFY 350	HFY 350	HFY 350	-
HF 50	HF 50Y60T	HF 50Y60T	-	HF 50

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers several hot rolled and cold rolled high strength steels at the 350 MPa yield strength level with different coating conditions. Several grades are available at the 50 ksi (~345 MPa) level strengths, also. A hot rolled grade is also available at this strength level. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

### Application

These grades are used in in automotive body structures, reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

### Chemistry

Product	Chemistry
Hot Rolled	Low carbon steels with micro-alloying additions
Cold Rolled	Low carbon steels with or without micro-alloying additions

### Processing

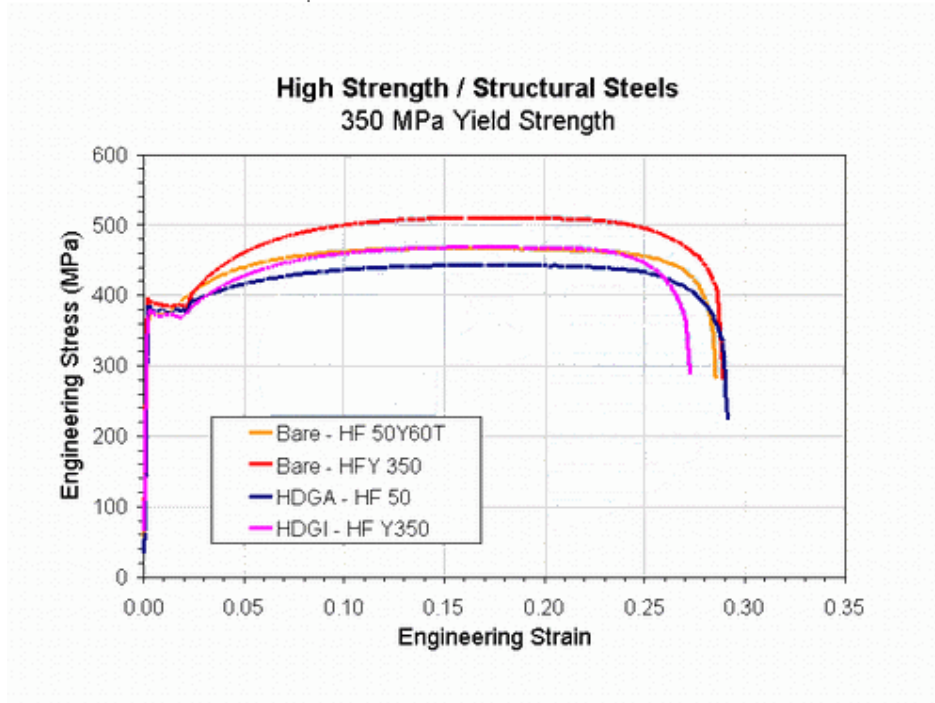
High Strength Steels are produced using regular low-carbon compositions strengthened with various alloying elements. Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced products are then further processed using continuously annealing technology.

### Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFY 350	380	525	28	1.1	0.17
Bare	HF 50Y60T	370	522	29	1.0	0.14
HDGI	HFY 350	382	452	32	1.0	0.16
HDGA	HF 50	376	480	29	1.0	0.18

<sup>1</sup> The strain range for n-value is 10-20% or Uniform Elongation

## Representative Stress-Strain Curves

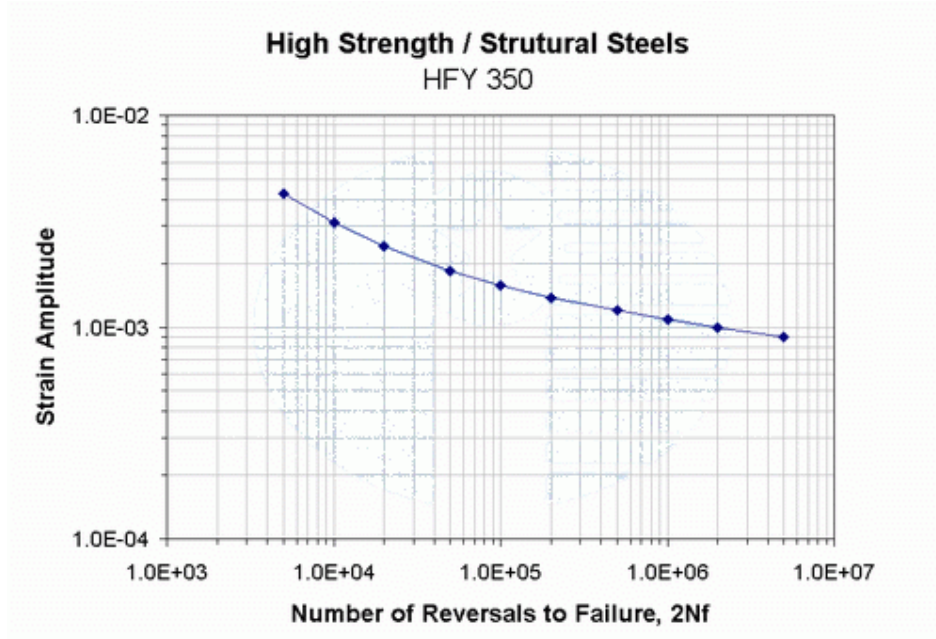


## Fatigue

### Strain Life Parameters

Fatigue Strength Coefficient (MPa)	939
Fatigue Ductility Coefficient	2.01
Fatigue Strength Exponent	-0.107
Fatigue Ductility Exponent	-0.789
Cyclic Strength Coefficient (MPa)	450
Cyclic Strain Hardening Exponent	0.050
Endurance Limit, $5 \times 10^6$ cycles (MPa)	172

Strain Life Curve



## High Strength - 370 MPa TS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
-	HFT 370	HFT 370	-	-

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers cold rolled high strength steels at the 370 MPa tensile strength level with different coating conditions. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

These grades are used in automotive body structures, reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

### Chemistry

Product	Chemistry
HFT 370	Low carbon steels containing Mn and P

### Processing

These High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn) and phosphorous (P). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced product is then further processed using continuously annealing technology.

## Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFT 370	240	394	40 <sup>J</sup>	1.2	0.19

<sup>1</sup> The strain range for n-value is 10-20%

<sup>J</sup> JIS test.

## High Strength - 390 MPa TS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
-	HFT 390	HFT 390	-	HFT 390

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers cold rolled high strength steels at the 390 MPa tensile strength level with different coating conditions. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

### Application

These grades are used in automotive body structures, reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

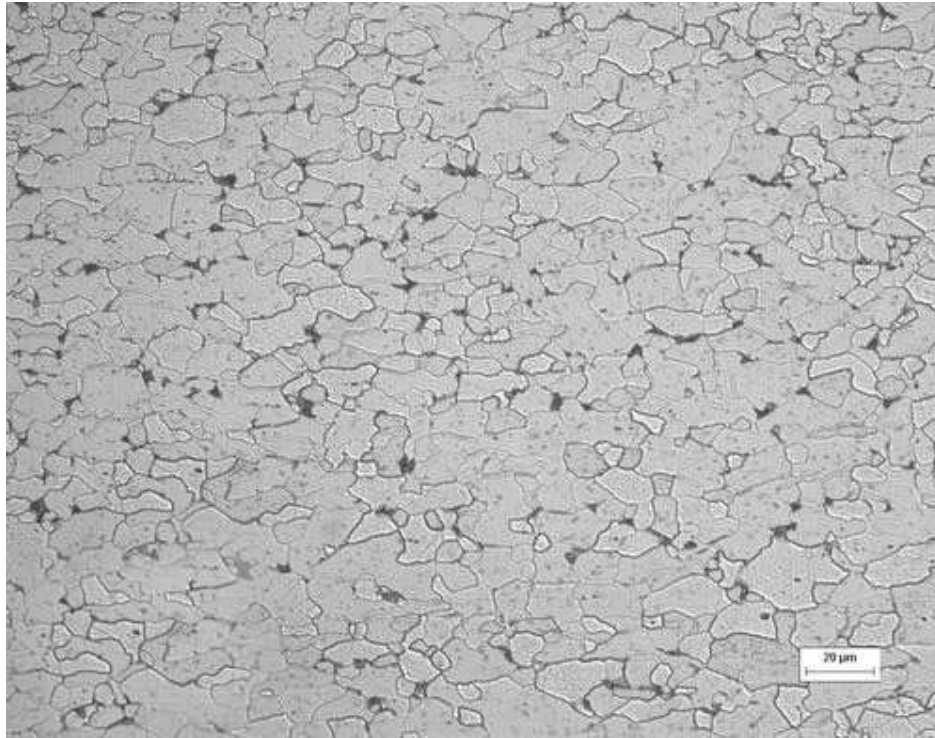
### Chemistry

Product	Chemistry
HFT 390	Low carbon steels containing Mn and Si

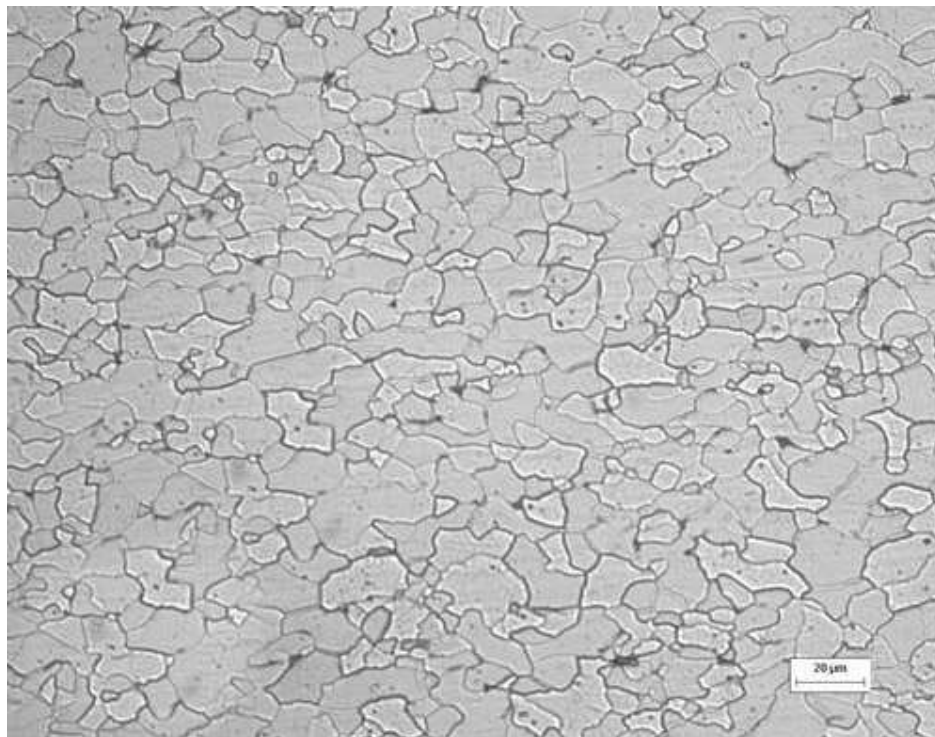
### Processing

High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn) and silicon (Si). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced product is then further processed using continuously annealing technology.

## Typical Microstructures



Bare-HFT 390 contains fine grained ferrite and pearlite



HDGA-HFT HFT 390 contains fine grained ferrite and pearlite

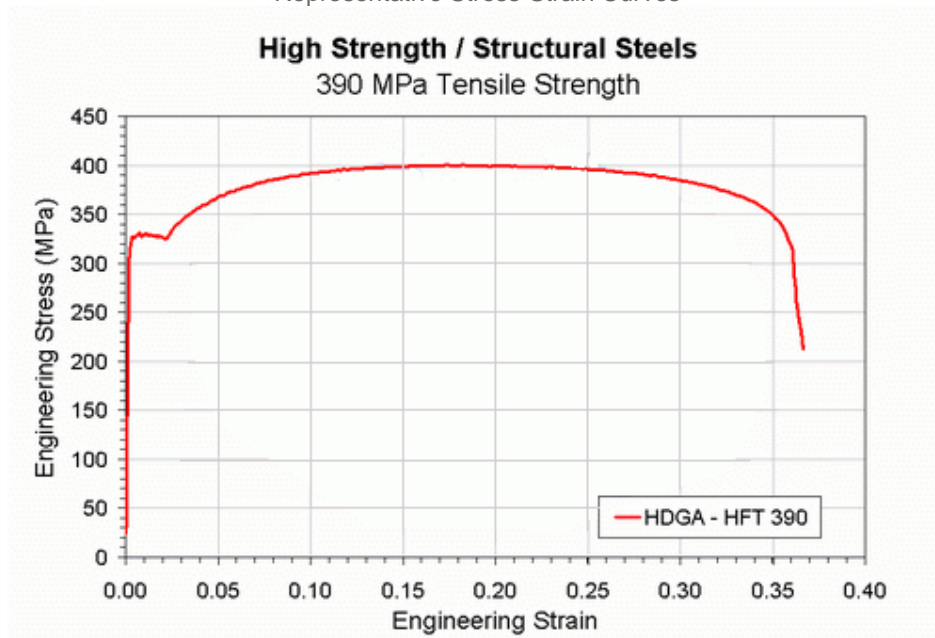
## Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFT 390	305	395	41 <sup>J</sup>	1.0	0.17
HDGA	HFT 390	285	430	38 <sup>J</sup>	1.0	0.17

<sup>1</sup> The strain range for n-value is 10-20%

<sup>J</sup> JIS test.

Representative Stress-Strain Curves



## High Strength - 400 MPa YS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
HF 60	HF 60	HF 60	HF 60	HF 60

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers hot rolled and cold rolled high strength steels at the 400 MPa yield strength level with different coating conditions. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

### Application

These grades are used in automotive body structures, reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

Note: Information contained in this document is subject to change. Please contact our sales team whenever you place an order to ensure that your requirements are fully met. Please contact us if you have a specific requirement that is not included in the range of products and services covered by this document.

Update: August 2009



## Chemistry

Product	Chemistry
HF 60	Low carbon steels with micro-alloying additions

## Processing

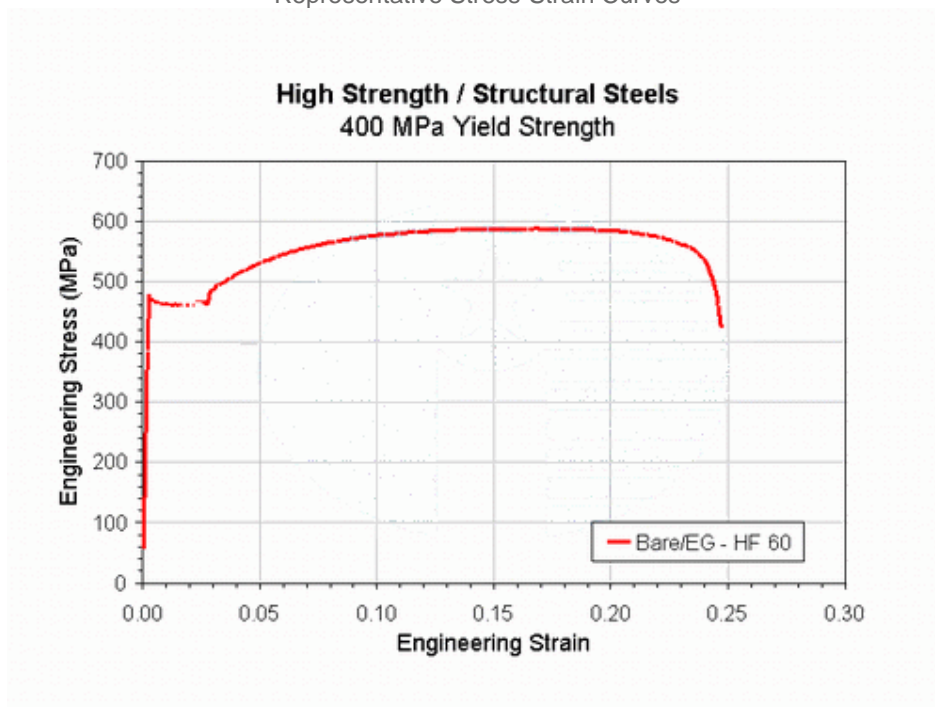
These High Strength Steels are produced using regular low-carbon compositions strengthened with various micro-alloying elements. Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced products are then further processed using continuously annealing technology.

## Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Hot Rolled	HF 60	468	536	27	1.0	0.15
Bare	HF 60	446	528	25	1.0	0.16

<sup>1</sup> The strain range for n-value is 10-20% or Uniform Elongation.

Representative Stress-Strain Curves



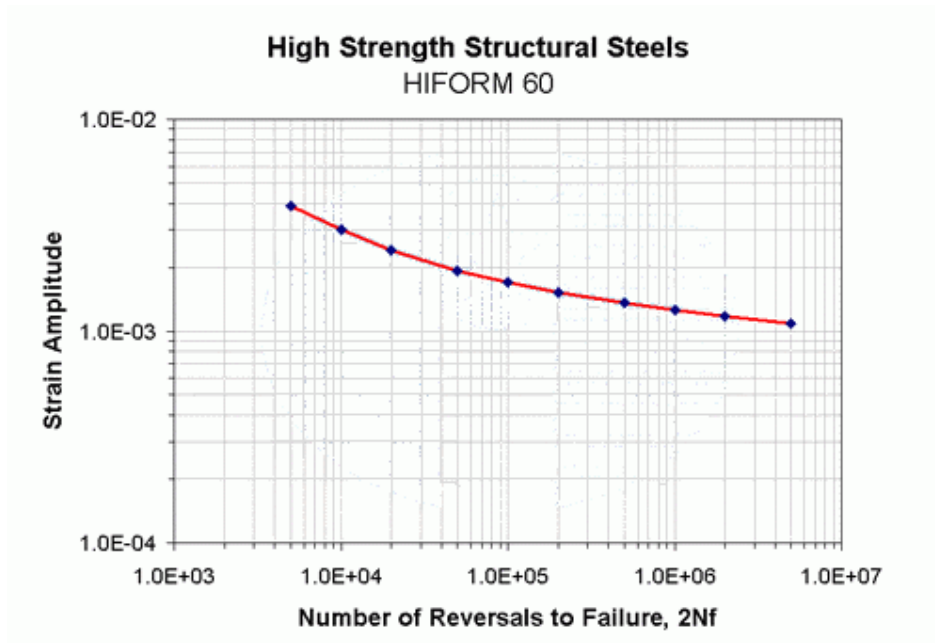
Stress-Strain curve data is available upon request

## Fatigue Behavior

### Strain Life Parameters

Fatigue Strength Coefficient (MPa)	763
Fatigue Ductility Coefficient	1.054
Fatigue Strength Exponent	-0.081
Fatigue Ductility Exponent	-0.733
Cyclic Strength Coefficient (MPa)	756
Cyclic Strain Hardening Exponent	0.110

Strain Life Curve



## High Strength - 440 MPa TS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
-	HFT 440	HFT 440	-	HFT 440

EG: Electrogalvanized  
 HDGI: Hot-Dip-Galvanized  
 HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers several cold rolled high strength steels at the 440 MPa tensile strength level with different coating conditions. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

### Application

These grades are used in automotive body structures such as reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

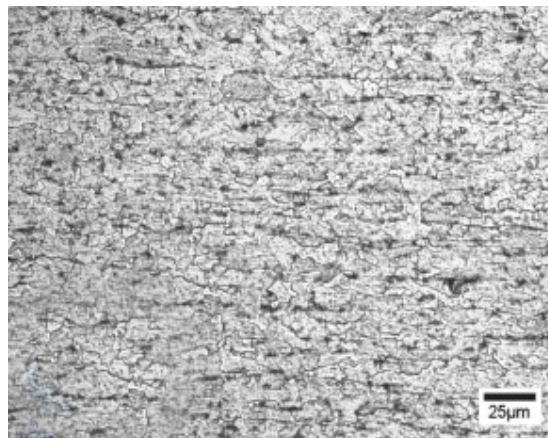
### Chemistry

Product	Chemistry
HFT 440	Low carbon steels containing Mn and Si

### Processing

These High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn) and silicon (Si). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced products are then further processed using continuously annealing technology.

Typical Microstructure



HDGA-HFT440 containing ferrite and pearlite.

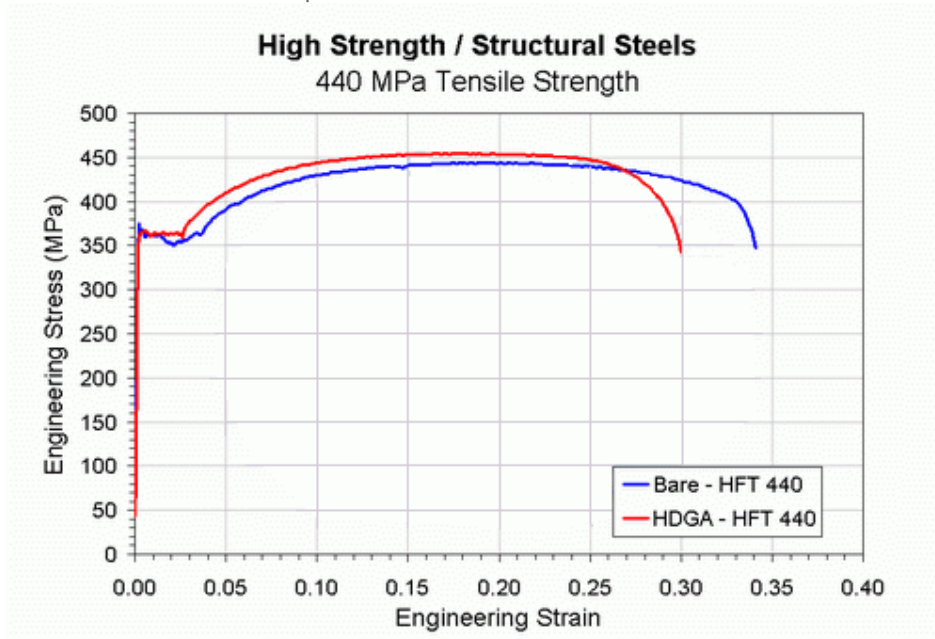
### Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFT 440	330	458	36 <sup>J</sup>	1.3	0.18
HDGA	HFT 440	340	462	36 <sup>J</sup>	1.2	0.17

<sup>1</sup> The strain range for n-value is 10-20%

<sup>J</sup> JIS test.

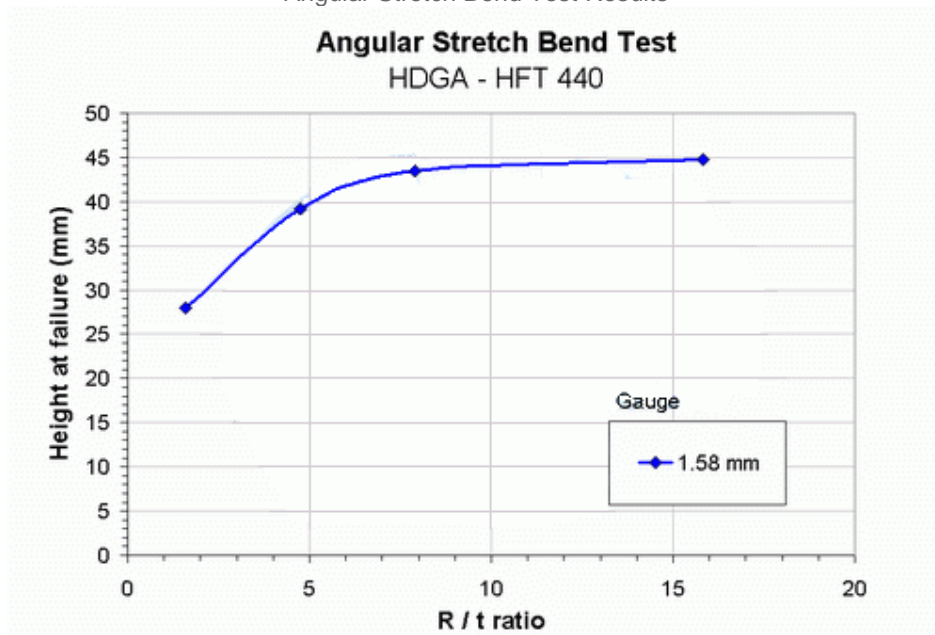
Representative Stress-Strain Curves



Stress-Strain curve data is available upon request

Formability Behavior

Angular Stretch Bend Test Results



Sheared Edge Stretching Test Results

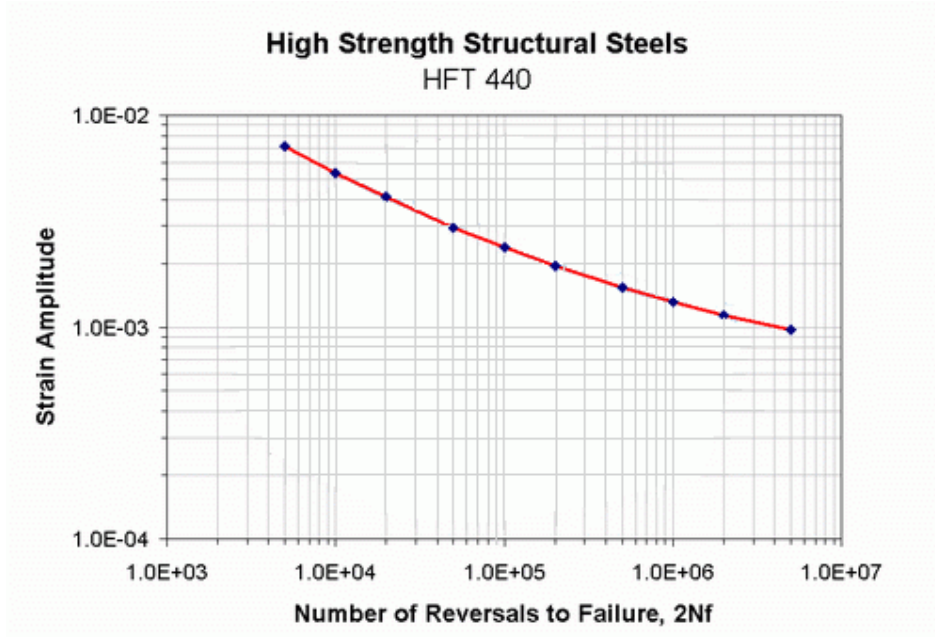
Product	Gauge (mm)	Average Hole Expansion (%)
HDGA - HFT 440	1.58	66.9

**Fatigue Behavior**

Strain Life Parameters

Fatigue Strength Coefficient (MPa)	841
Fatigue Ductility Coefficient	0.468
Fatigue Strength Exponent	-0.105
Fatigue Ductility Exponent	-0.523
Cyclic Strength Coefficient (MPa)	966
Cyclic Strain Hardening Exponent	0.198

Strain Life Curve



## High Strength - 500 MPa YS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled		Cold Rolled		
Uncoated	Uncoated	EG	HDGI	HDGA
-	HFY 500	HFY 500	-	-
-	HF 70Y80T	HF 70Y80T	-	-

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers several high strength steels at the 500 MPa yield strength level with different coating conditions. These grades are part ArcelorMittal's HI FORM (HF) family of steels.

A high yield-to-tensile-strength ratio dual phase steel (HF 70Y80T) is also available at this strength level.

### Application

These grades are used in automotive body structures, reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

### Chemistry

Product	Chemistry
HFY 500	Low carbon steels containing Mn and Si
HF 70Y80T	

### Processing

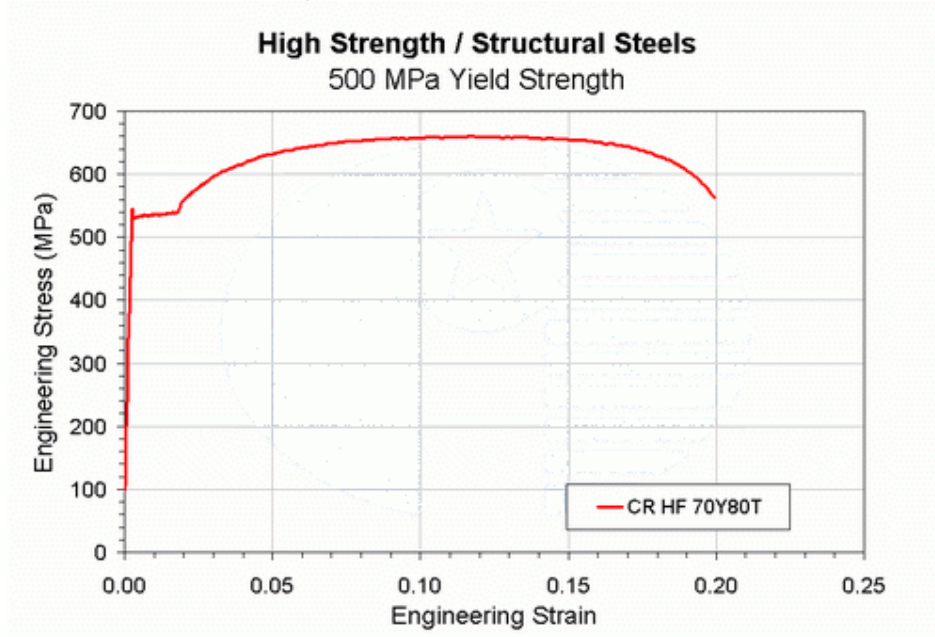
High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced products are then further processed using continuously annealing technology.

### Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFY 500	526	705	19	0.9	0.14
Bare	HF 70Y80T	532	660	20	0.9	0.14

<sup>1</sup> The strain range for n-value is 10-20%

Representative Stress-Strain Curves



Stress-Strain curve data is available upon request

## High Strength - 550 MPa YS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
-	HF 80Y100T	HF 80Y100T	-	-

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

ArcelorMittal offers several cold rolled high strength steels at the 550 MPa yield strength level with different coating conditions. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

These grades also a high yield-to-tensile-strength ratio dual phase steel (HF 80Y100T).

### Application

These grades are used in automotive body structures, reinforcements and brackets. The grade can used for rollforming and stamping of door-intrusion beams, bumper-reinforcement beams, and various seating components, such as tracks, pillars, risers and towers.

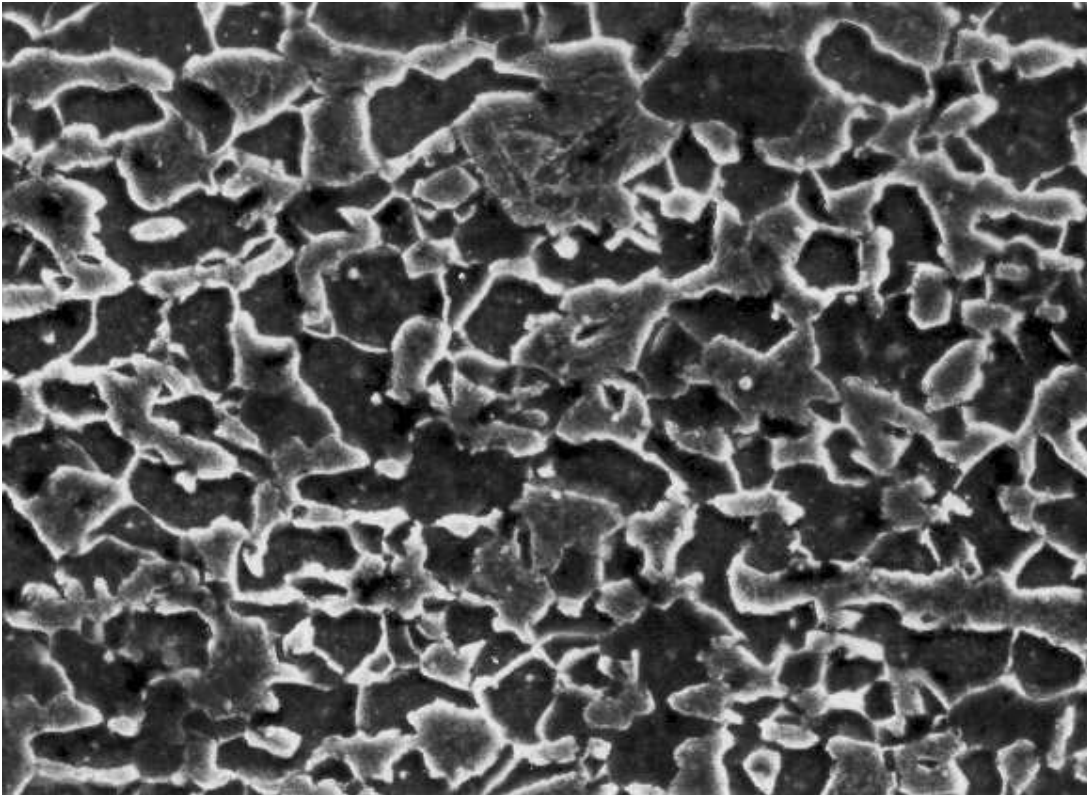
### Chemistry

Product	Chemistry
HF 80Y100T	Low carbon steels containing Mn and Si

## Processing

High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn) and silicon (Si). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced product is then further processed using continuously annealing technology.

### Microstructure



HF 80Y100T contains ferrite and martensite.

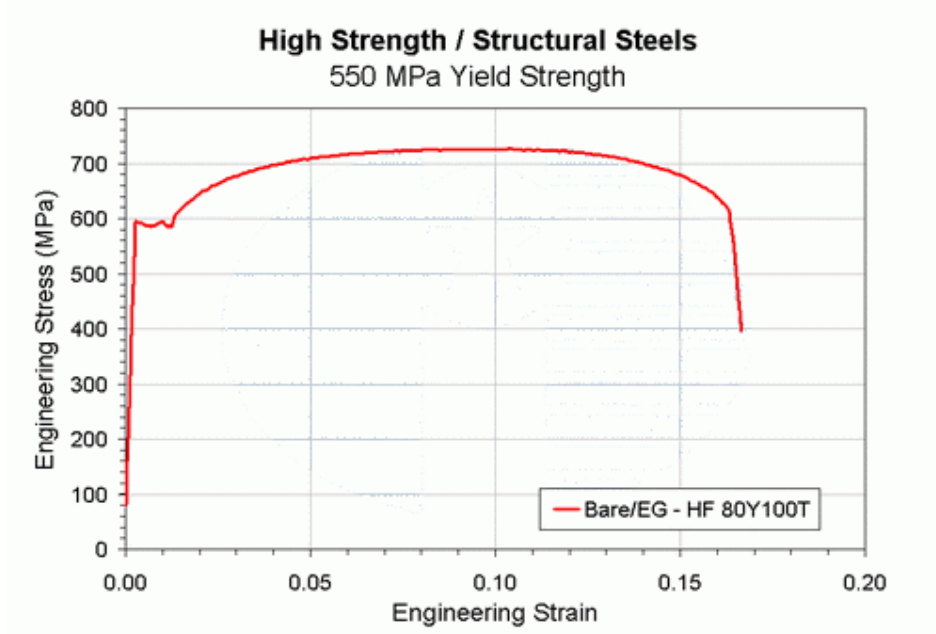
### Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	R-bar	n <sup>1</sup>
Bare	HF 80Y100T	584	740	17	0.9	0.12

<sup>1</sup> The strain range for n-value is 10%-Uniform Elongation.



Representative Stress-Strain Curves



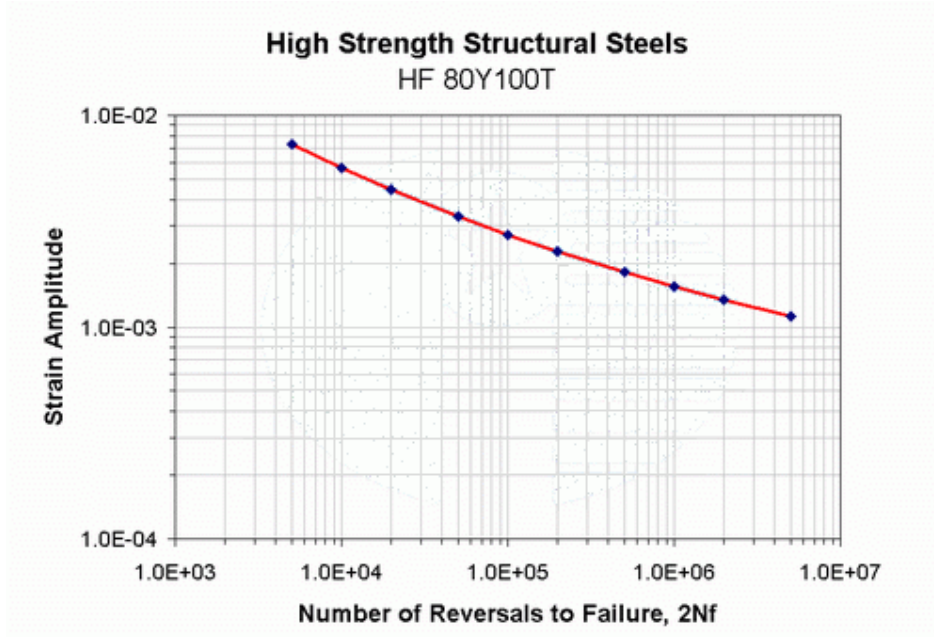
Stress-Strain curve data is available upon request

**Fatigue Behavior**

Strain Life Parameters

Fatigue Strength Coefficient (MPa)	1682
Fatigue Ductility Coefficient	0.329
Fatigue Strength Exponent	-0.139
Fatigue Ductility Exponent	-0.498
Cyclic Strength Coefficient (MPa)	2211
Cyclic Strain Hardening Exponent	0.272
Endurance Limit, $5 \times 10^6$ cycles (MPa)	207

Strain Life Curve



## High Strength - 590 MPa TS Steels

### Grade Availability - ArcelorMittal Products

Hot Rolled	Cold Rolled			
Uncoated	Uncoated	EG	HDGI	HDGA
DEV HFT 590 SF	HFT 590	-	-	HFT 590

EG: Electrogalvanized

HDGI: Hot-Dip-Galvanized

HDGA: Hot-Dip-Galvannealed

'DEV': Products are under development or in limited production.

**Please inquire about the status and availability of these products.**

ArcelorMittal offers several cold rolled high strength grades at the 590 MPa tensile strength level with different coating conditions. These grades are part of ArcelorMittal's HI FORM (HF) family of steels.

Under development is a stretch flanging steels (HFT 590 SF) that will be designed to have high hole expansions suitable for stretch flanging operations.

### Application

These grades are used in in automotive body structures such as reinforcements and brackets where sufficient strength is needed to achieve optimum part performance.

The 'SF' grade can be used for structural and chassis parts.

### Chemistry

Product	Chemistry
HFT 590	Low carbon steels containing Mn and Si

Note: Information contained in this document is subject to change. Please contact our sales team whenever you place an order to ensure that your requirements are fully met. Please contact us if you have a specific requirement that is not included in the range of products and services covered by this document.

Update: August 2009

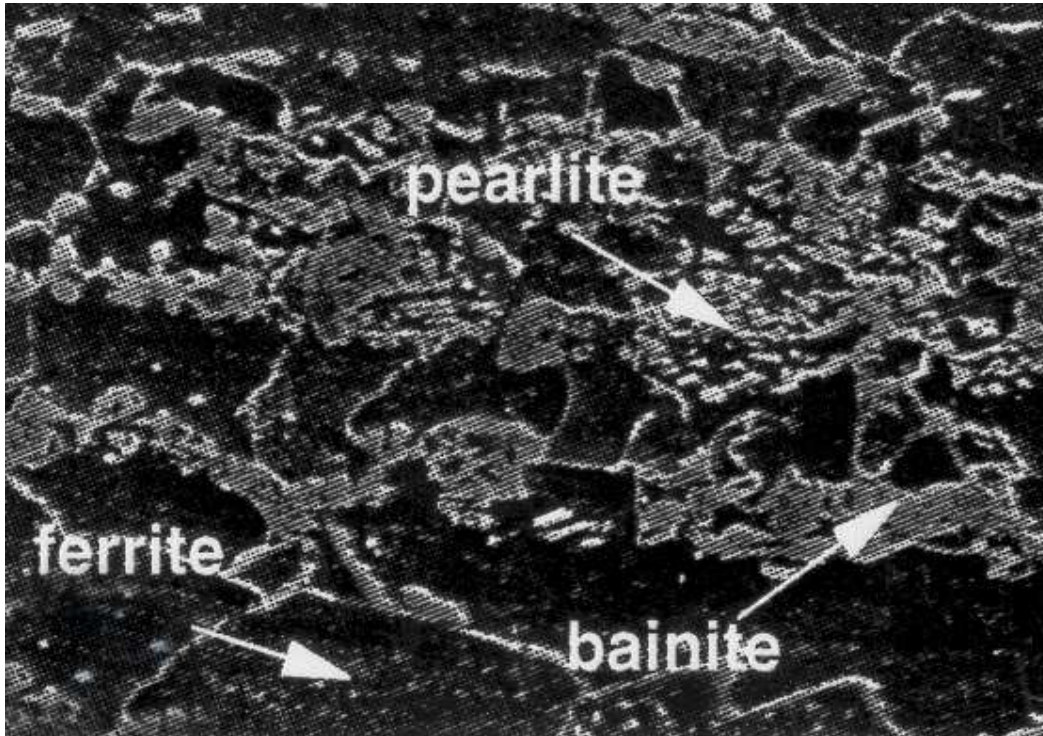
## Processing

These High Strength Steels are produced using regular low-carbon compositions strengthened with manganese (Mn) and silicon (Si). Steels are then cast into slabs and hot rolled. Hot rolled coils are further processed and cold reduced into lighter gauges. The cold reduced product is then further processed using continuously annealing technology.

Typical Microstructure



HDGA-HFT 590 containing ferrite, pearlite and bainite.



HDGA-HFT 590 containing ferrite, pearlite and bainite.

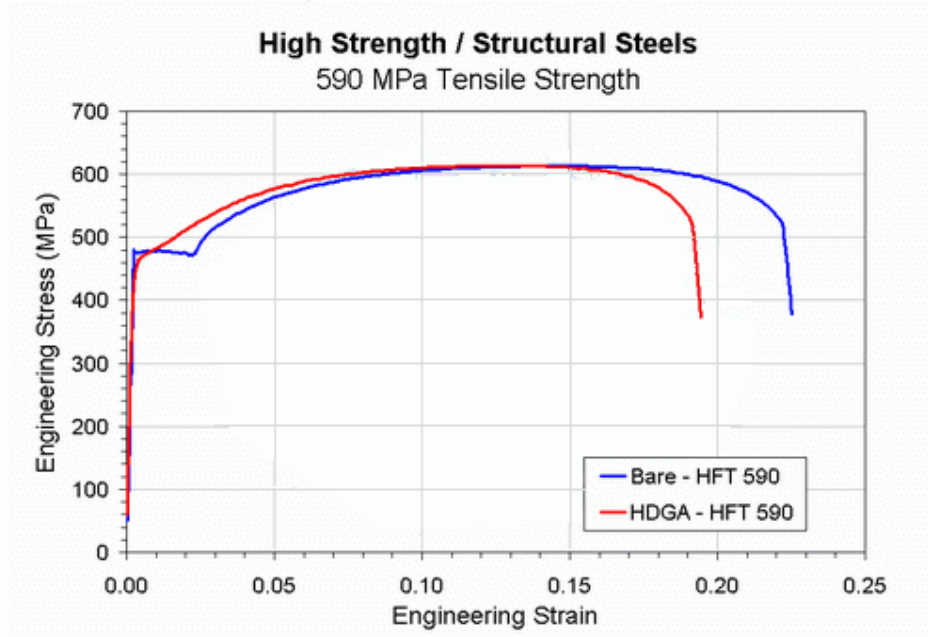
### Typical Mechanical Properties

Coating	Product	Yield Strength (MPa)	Tensile Strength (MPa)	Total Elongation (%)	r-bar	n <sup>1</sup>
Bare	HFT 590	512	700	23 <sup>J</sup>	1.0	0.15
HDGA	HFT 590	515	633	23 <sup>J</sup>	1.0	0.13

<sup>1</sup> The strain range for n-value is 10%-Uniform Elongation.

<sup>J</sup> JIS test.

Representative Stress-Strain Curves



Stress-Strain curve data is available upon request

**Fatigue Behavior**

Strain Life Parameters

Fatigue Strength Coefficient (MPa)	886
Fatigue Ductility Coefficient	0.480
Fatigue Strength Exponent	-0.095
Fatigue Ductility Exponent	-0.538
Cyclic Strength Coefficient (MPa)	983
Cyclic Strain Hardening Exponent	0.173

Strain Life Curve

