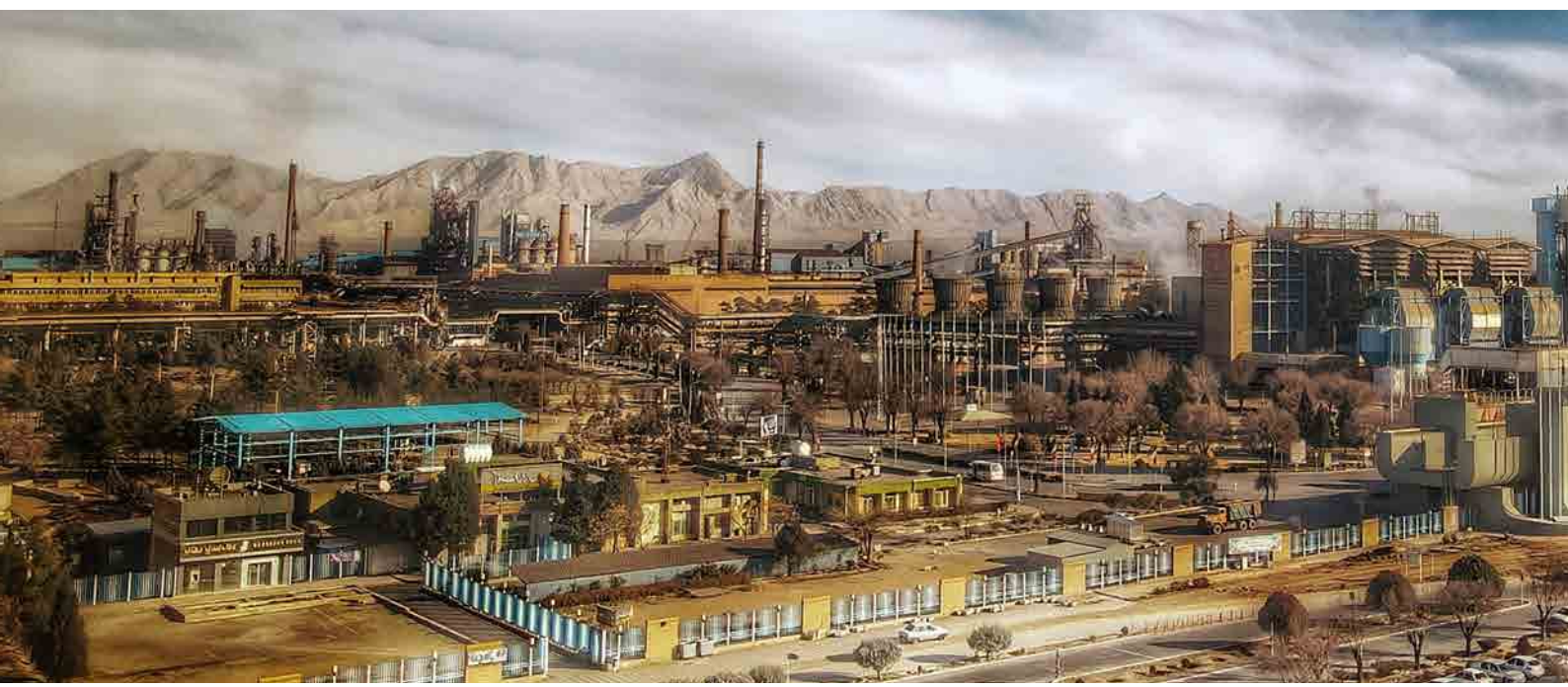
ESCO
Esfahan Steel Company



constiuct with confidence

E S C O

ESFAHAN STEEL COMPANY


ESCO

Esfahan Steel Company (ESCO)

Esfahan Steel Company (ESCO) is one of the largest infrastructure industries and the first producer of constructional steel products in Iran. The construction process of the factory started in 1967 and first production started in 1971 with the initial capacity of 550 thousand tons annually. This factory uses blast furnace technology and direct use of iron ore in the production process. By development of various plants inside of the factory in 1972, 1978 and 1990, including coking making, agglomeration, blast furnace, steelmaking, rolling-mill, oxygen and power plant, ESCO was able to reach to the capacity of 2 million tons per year. Furthermore, due to the higher production capacity of the steel sector (steelmaking and rolling-mill plants) compared to the cast-iron sector (coking making, agglomeration and blast furnace plants), a Tavazon project was planned and implemented in 2013. By complete utilization of this plan (Coking Battery No. 3, Agglomeration No. 4, Blast Furnace No. 3 and 110 MW Power Plant), the nominal production capacity of 3.6 million tons per year was achieved.

Pursuant to the development process of various plants in ESCO as well as the urgent need of the country and export markets for strategic products, a new casting station with the production capacity of over one million tons of steel ingots was constructed and commissioned. Also, the development project of rolling-mill plant No.650 was implemented for the production of large size wide flange beams and heavy profile rails. By commissioning of the rail production line, our dear country, Iran, was enabled to join the few producers of all kinds of railway and subway rails with the highest standards in the world.

All products in ESCO, is produced in accordance with regional and global standards using modern technologies. These products supply domestic market demand and also exports to more than 30 countriesaround the world. The unique quality of the products, the reliability of the company and meeting the needs and expectations of the customers have introduced this company as a reliable brand at the international level.

The main products of ESCO include all kinds of plain and ribbed rebars, beams, angles, channels, bloom/billets, wire rod, coils, industrial rebars, steel structure sheets, railway and subway rails, and mining arches. Moreover, side products produced in this company comprise solid cast iron, tar, xylene, toluene, benzene, raw benzene, ammonium sulfate, coke, steelmaking and blast furnace slag, steelmaking industrial sludge, blast furnace dust, quicklime, oxygen, liquid nitrogen and sulfuric acid.

In consistent with sustainable development concept and according to environmental policies, ESCO has designed and implemented huge environmental projects by allocating significant resources and funds.

One of the most important achievements is cultivation and conservation of more than 16,500 hectares of forest, which is 84 times of a required standard green-space for an industrial complex of similar area. 14,500 hectares of these forests are irrigated in the form of rainfed irrigation and 2,000 hectares are irrigated using treated wastewater.

The training of employees has been planned and started since 1968, then according to the existing facilities and in order to provide scientific and cultural services, Esfahan Steel Applied Scientific University was established in associate and bachelor degrees. It is worth mentioning that the training process in ESCO is in accordance with the international standard (ISO 10015). Aditionally, in order to protecting human resources and providing medical services for the society, the Esfahan Steel Shahid Motahri Hospital was established in 1989, currently operating as one of the most important hospitals in the region, in accordance with the ISO 9001 standard. In 2015, this hospital was designated as the best private hospital of Esfahan province.

Esfahan Steel Cultural and Sports Club established in 1968, is one of the oldest and most proud clubs in Iran, in the fields of public sports and championships. “Gando”, a symbol adapted from “the short-nosed Iranian crocodile”, was chosen as a nickname for this club in order to protect the environment and preserve rare species of animals. Gando is pursuing goals by the vision of «best in Iran and prominent in the world».

Objectives and strategies of Esfahan Steel Company

vision

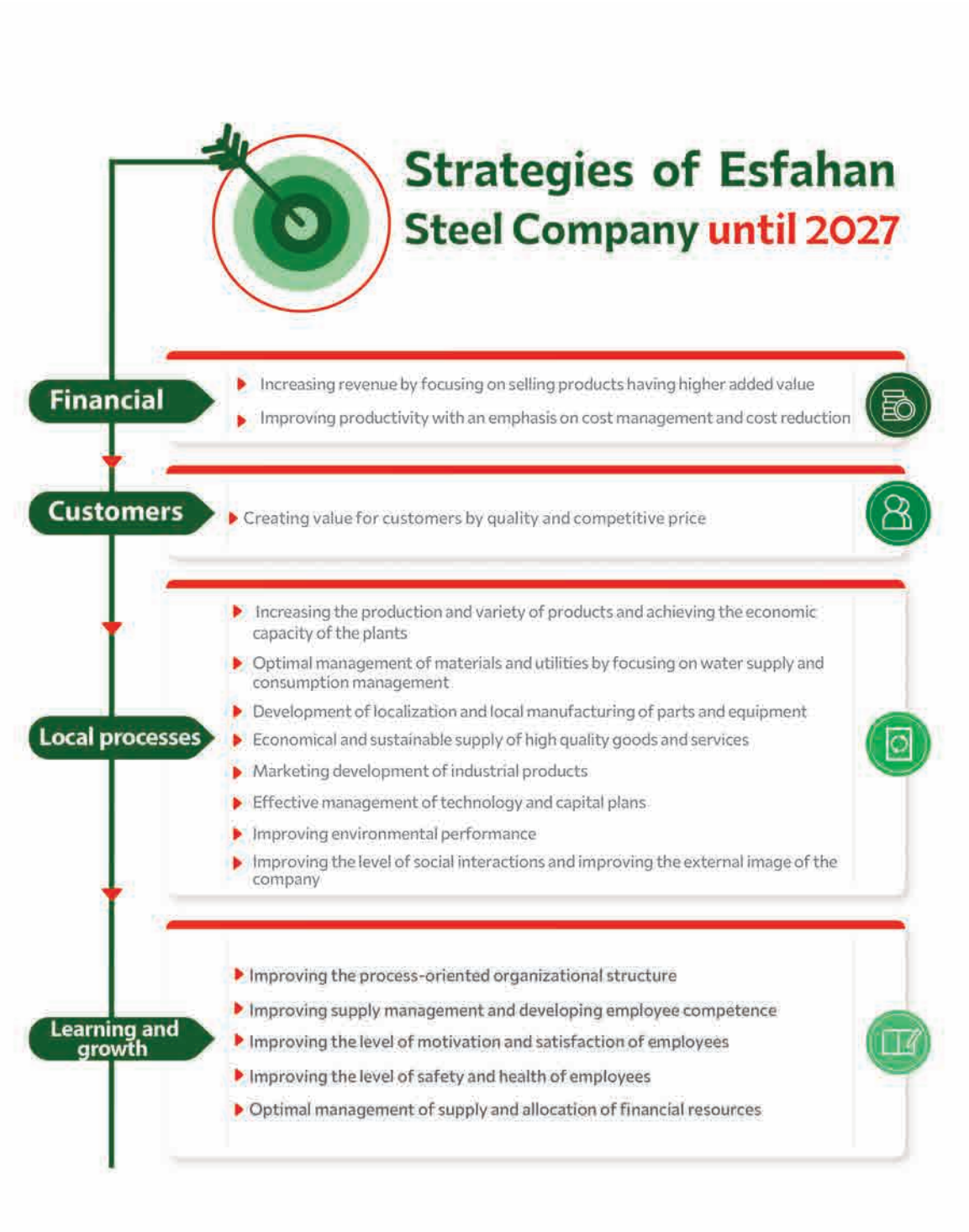
The leader in the production of long steel sections in the Middle East with excellence in quality and profitability and a reliable brand in domestic and foreign markets.

Values

1. Compliance with the values of the Islamic society
2. Satisfaction of customers and other stakeholders
3. Learning, innovation and performance excellence
4. Safety and work discipline
5. environment-friendly

Mission

Production of high quality steel products required by customers in accordance with the industrial and economic development.


Strategies of Esfahan Steel Company until 2027
Financial
Increasing revenue by focusing on selling products having higher added value
Improving productivity with an emphasis on cost management and cost reduction
Customers
Creating value for customers by quality and competitive price
Local processes
Increasing the production and variety of products and achieving the economic capacity of the plants
Optimal management of materials and utilities by focusing on water supply and consumption management
Development of localization and local manufacturing of parts and equipment
Economical and sustainable supply of high quality goods and services
Marketing development of industrial products
Effective management of technology and capital plans
Improving environmental performance
Improving the level of social interactions and improving the external image of the company
Learning and growth
Improving the process-oriented organizational structure
Improving supply management and developing employee competence
Improving the level of motivation and satisfaction of employees
Improving the level of safety and health of employees
Optimal management of supply and allocation of financial resources

Esfahan Steel Company

A symbol of the link between industry and green space

Esfahan Steel Company Production Area:
800 hectares

Green Space Area:
16500 hectares

ESCO's green space

Annually, an amount of up to 3 miliun dolar is the cost of Maintaining this green space.

84 times of required standard and 20 time of the area of the company.

ESCO has provided valuable services to the society by planting and maintaining the "largest man-made forest in Iran".

Based on the international standard, ESCO must create green space equal to 25% of its plant area,i.e.200 hectares

شرکت ذوب آهن اصفهان
روابط عمومی

The greenery of ESCO has increased the air quality in the region, And the air quality index (AQI) has improved.

Esfahan Steel Company

A leader in social responsibilities

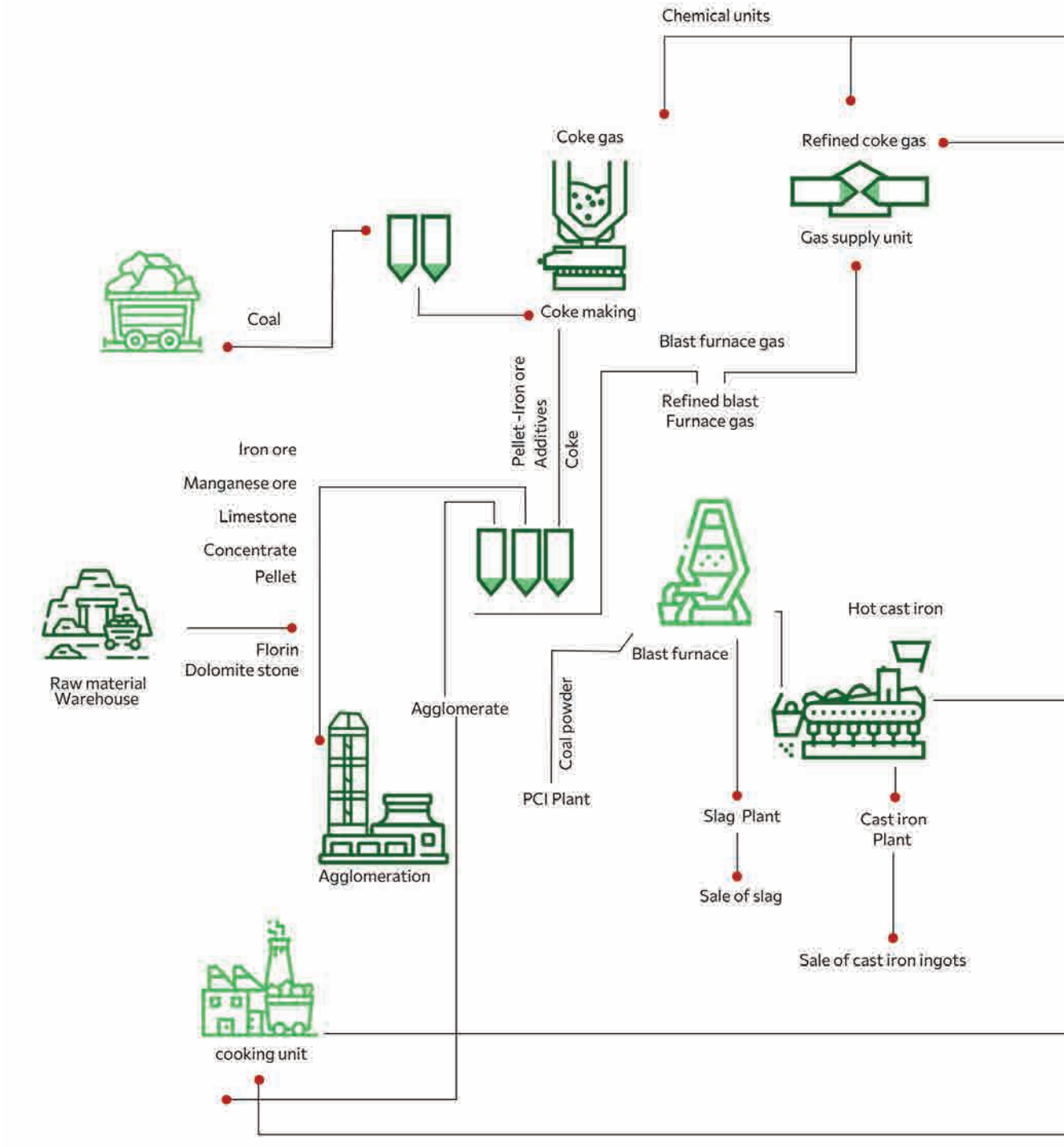
Times of the required standard, irrigating 14500-hectar rain-fed and 2000-hectare using sewage

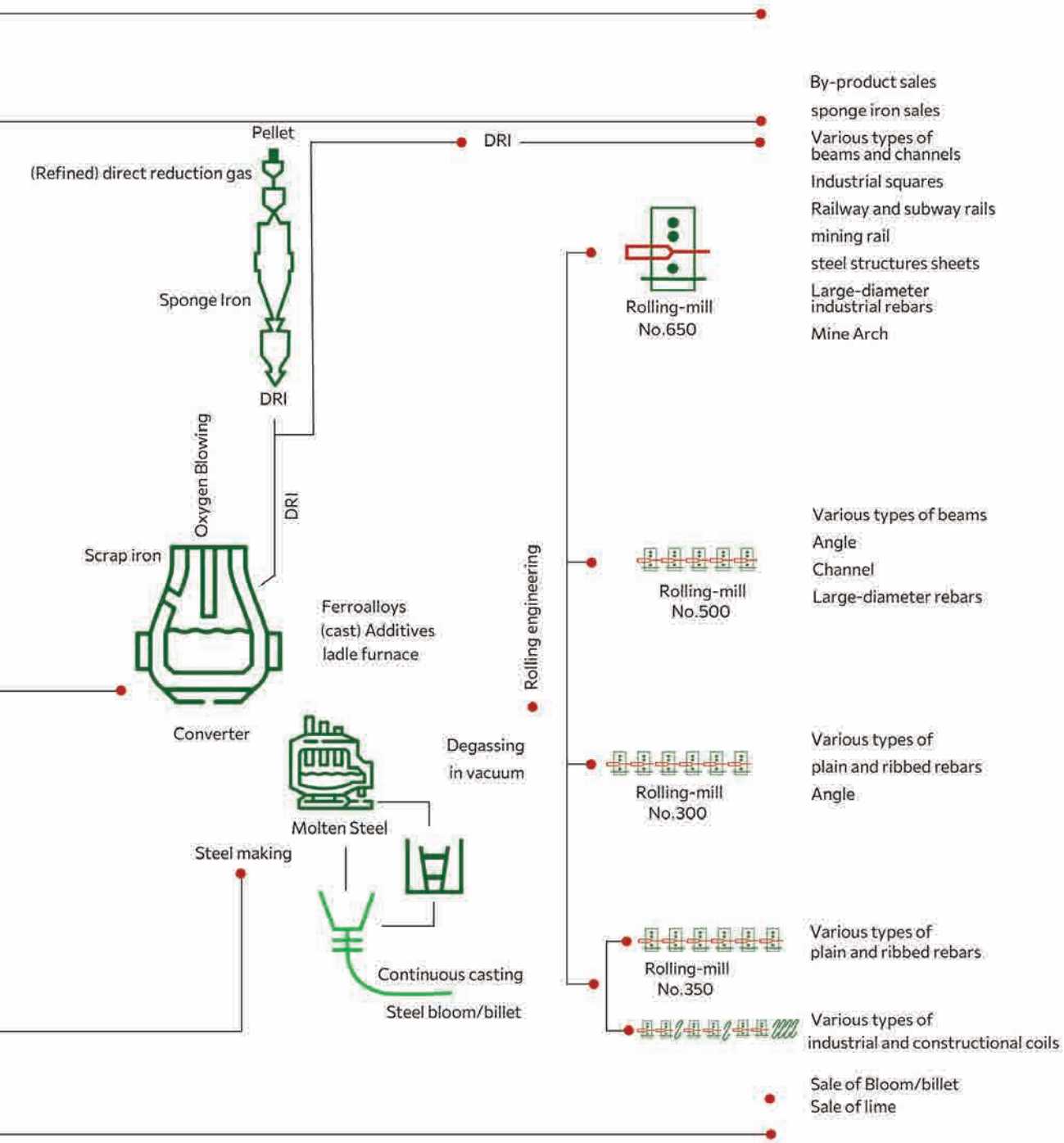
Creating and retaining 16500-hectare hand-planted forest

- Establishment of a sport club: **Foolad Shahr**
- Establishment of Valfajr charity: **Esfahan Steel Company**
- Establishment of a 1st grade **hospital: shahid motahari**
- Cash and non-cash contributions: **to the flood and earthquake victims**
- Holding cultural and religious ceremonies: **in the region**
- Construction of roads and communication bridges: **in the region**

Construction of the Fooldad Shahr city, Allocating the Shahid Motahari hospital for treatment of patients during the outbreak of Cvid-19, support of vulnerable statums in the form of various livelihood packages, training of 150 thousand people for the country's industry during the past half century.

Esfahan Steel Company production line Overview




By-product sales
sponge iron sales
Various types of
beams and channels
Industrial squares
Railway and subway rails
mining rail
steel structures sheets
Large-diameter
industrial rebars
Mine Arch
Rolling-mill
No.650
Various types of beams
Angle
Channel
Large-diameter rebars
Rolling-mill
No.500
Various types of
plain and ribbed rebars
Angle
Rolling-mill
No.300
Various types of
plain and ribbed rebars
Rolling-mill
No.350
Various types of
industrial and constructional coils
Sale of Bloom/billet
Sale of lime
Rolling engineering
Pellet
DRI
(Refined) direct reduction gas
Sponge Iron
DRI
Oxygen Blowing
DRI
Scrap iron
Ferroalloys
(cast) Additives
ladle furnace
Converter
Degassing
in vacuum
Molten Steel
Steel making
Continuous casting
Steel bloom/billet

Quality

Prodeuced products in Esfahan Steel Company are in accordance with domestic and international standards a quality beyond the minimum requirements of the standards.
Esfahan Steel Company, the first steel producer in Iran, has homologation certificate for the export of ribbed rebar to Germany, CE certificate for the export of rebar to the European Union member countries, and CARES certificate for the export of rebar to the British and Persian Gulf countries.
Esfahan Steel Company has certificates for quality management systems (ISO 9001), environment (ISO 14001), occupational health and safety (SIO 45001), training (ISO 10015), customer complaints (SIO 10002) and customer satisfaction (ISO 10004).


ICDQ
PRODUCT
DESIGNATION
STANDARDS


ICDQ
HOT ROLLED PRODUCTS OF STRUCTURAL STEEL
ESFAHAN STEEL COMPANY CO


CERTIFICATE
OF APPROVAL
CARES


APPENDIX TO CARES CERTIFICATE NO. 220201
CARES

Laboratory

- The Central Laboratory, as one of the oldest steel industry laboratories in the Iran, was established in 1971 at the same time as the Esfahan Steel Company was established.

- The central laboratory is made up of different sections, including chemical, fluid, spectrographic, mechanical, metallographic, refractory products and construction materials, coke and chemical materials as well as test material control laboratories. During more than half a century of activity, this laboratory has managed to achieve valuable successes by updating test methods in accordance with valid national and international standards along with updating equipment and measuring devices from reliable brands as well as developing laboratory services. Obtaining prominent national laboratory title from the National Standards Organization, producing laboratory reference materials in some required cases, and also obtaining top positions and ranks in some metallurgical skill tests in Iran, are among achievements of central lablatory.
- The Central Laboratory of Esfahan Steel Compny has lablatory qualification certificate based on the requirements of the ISO/IEC17025 standard from the National Qualification Certification Center of Iran. Also, this lablatory designated as an active laboratory in the laboratory network of strategic technologies under the supervision of the Vice President of Science and Technology of the Presidency.

  Providing customer satisfaction and assurance in validity of the test results, along with the observance of the neutrality and confidentiality, are among the main principles of the quality policy of the Central Laboratory in Esfahan Steel Company.


Islamic Republic of Iran

NACI

گواهینامه تایید صلاحیت آزمایشگاه
Laboratory Accreditation Certificate

Esfahan Steel Company Laboratory

آزمایشگاه شرکت سهامی ذوب آهن اصفهان


جمهوری اسلامی ایران
Islamic Republic of Iran

NACI

گواهینامه تایید صلاحیت آزمایشگاه
Laboratory Accreditation Certificate

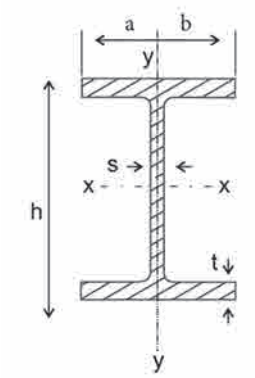
Zob Ahan Esfahan

ذوب آهن اصفهان

Semi-wide Parallel flange beam (IPE)

Based on the Iranian national standard No.1791, Parallel semi-wide flange hot-rolled beams (I-2) are produced in Esfahan Steel, in accordance with DIN 1025-5 standards in dimensions, weight and static values, EN 10034 in tolerances, EN10025-2 in technical specification and chemical analysis, as follows:

30 27 24 22 20 18 16 14 12



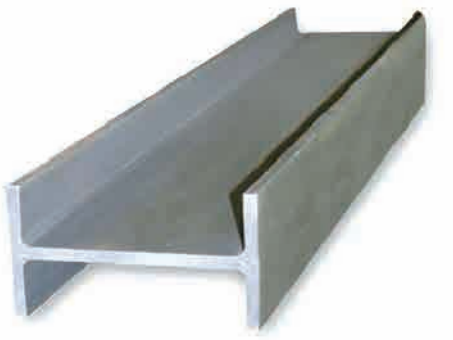


Table No. (1): Dimensional and weight specification of manufactured beams

Size	Dimensions and Tolerances (mm)									Weight		
	Height (h)		Flange width (b)		Web thickness (s)		Flange thickness (t)		Corners curvature radius	Nominal weight (Kg/m)	٪Tolerance	
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance			Branch	Package or shipment
12	120	+3 -2	64	+4 -1	4.4	± 0.7	6.3	+1.5 -0.5	7	10.4	± 6	± 4
14	140		73		4.7		6.9	+2 -1	7	12.9		
16	160		82		5.0		7.4		9	15.8		
18	180		91		5.3		8.0		9	18.8		
20	200	+4 -2	100		5.6		8.5		12	22.4		
22	220		110		5.9		9.2		12	26.2		
24	240		120	+4 -2	6.2		9.8		15	30.7		
27	270		135		6.6		10.2	+2.5 -1.5	15	36.1		
30	300		150		7.1	± 1	10.7		15	42.2		

Table No. (2): Sizes and static values of manufactured beams

Beam No.	Cross-sectional area F (cm^2)	Surface area of one meter U (m^2)	Static values relative to bending axes						Moment of inertia of half section S_x (Cm^3)	The distance between the center of tensile and compressive stresses s_x (Cm)
			X-X axle			Y-Y axle				
			Moment of inertia I_x (Cm^4)	Section modulus W_x (Cm^3)	Radius of gyration i_x (Cm)	Moment of inertia I_y (Cm^4)	Section modulus W_y (Cm^3)	Radius of gyration i_y (Cm)		
12	13.2	0.475	318	53.0	4.90	27.7	8.65	1.45	30.4	10.5
14	16.4	0.551	541	77.3	5.74	44.9	12.3	1.65	44.2	12.3
16	20.1	0.623	869	109	6.58	68.3	16.7	1.84	61.9	14
18	23.9	0.698	1320	146	7.42	101	22.2	2.05	83.2	15.8
20	28.5	0.768	1940	194	8.26	142	28.5	2.24	110	17.6
22	33.4	0.848	2770	252	9.11	205	37.3	2.48	143	19.4
24	39.1	0.922	3890	324	9.97	284	47.3	2.69	183	21.2
27	45.9	1.04	5790	429	11.2	420	62.2	3.02	242	23.9
30	53.8	1.16	8360	557	12.5	604	80.5	3.35	314	26.6

Table No. (3): Chemical composition of manufactured beams

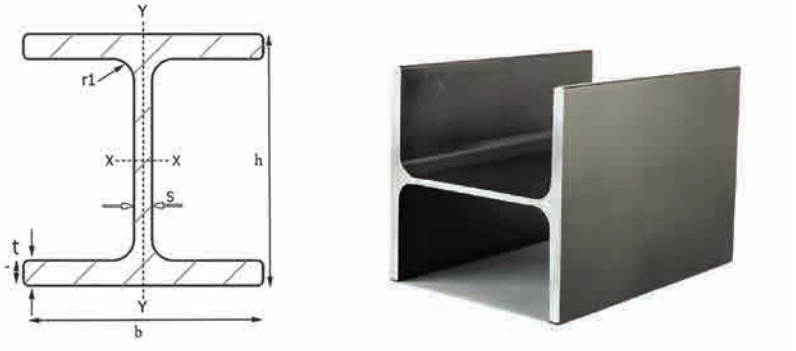
Steel type	weight of element(٪)						
	C (Max)	Si	Mn	P (Max)	S (Max)	N (Max)	C.E.(Max)
Steel37 (S235JR)	0.19	0.12 -0.40	0.25 -1.50	0.050	0.050	0.014	0.35
Steel 44 (S275JR)	0.24	0.15 -0.45	0.40 -1.60	0.050	0.050	0.014	0.40
Steel 52 (S355JR)	0.27	≤ 0.60	≤ 1.70	0.050	0.050	0.014	0.45

Table number (4): Mechanical properties of manufactured beams

Steel type	Tensile test			Cold bending test under an angle of 180 degrees
	Minimum yield stress Y.P N/mm^2	Tensile Strengh U.T.S N/mm^2	Minimum percentage of relative elongation $L_o = 5.65\sqrt{S_o}$	The diameter of the bending jaw relative to the thickness of the sample
S235JR (St-37)	235	360 - 510	26	1 t
S275JR (St-44)	275	410 - 560	23	2.5 t
S355JR (St-52)	355	470 - 630	22	2.5 t

Medium-weight Wide Parallel Flange Beam (IPB)

Based on the Iranian national standard No. 14484, Parallel wide flange hot-rolled beams with medium weight (I-5) are produced in Esfahan Steel Company in accordance with IPB and DIN 1025-2 standards in dimensions, weight and static values, EN 10034 in tolerance, EN10025-2 in technical specification and chemical analysis, as follows:



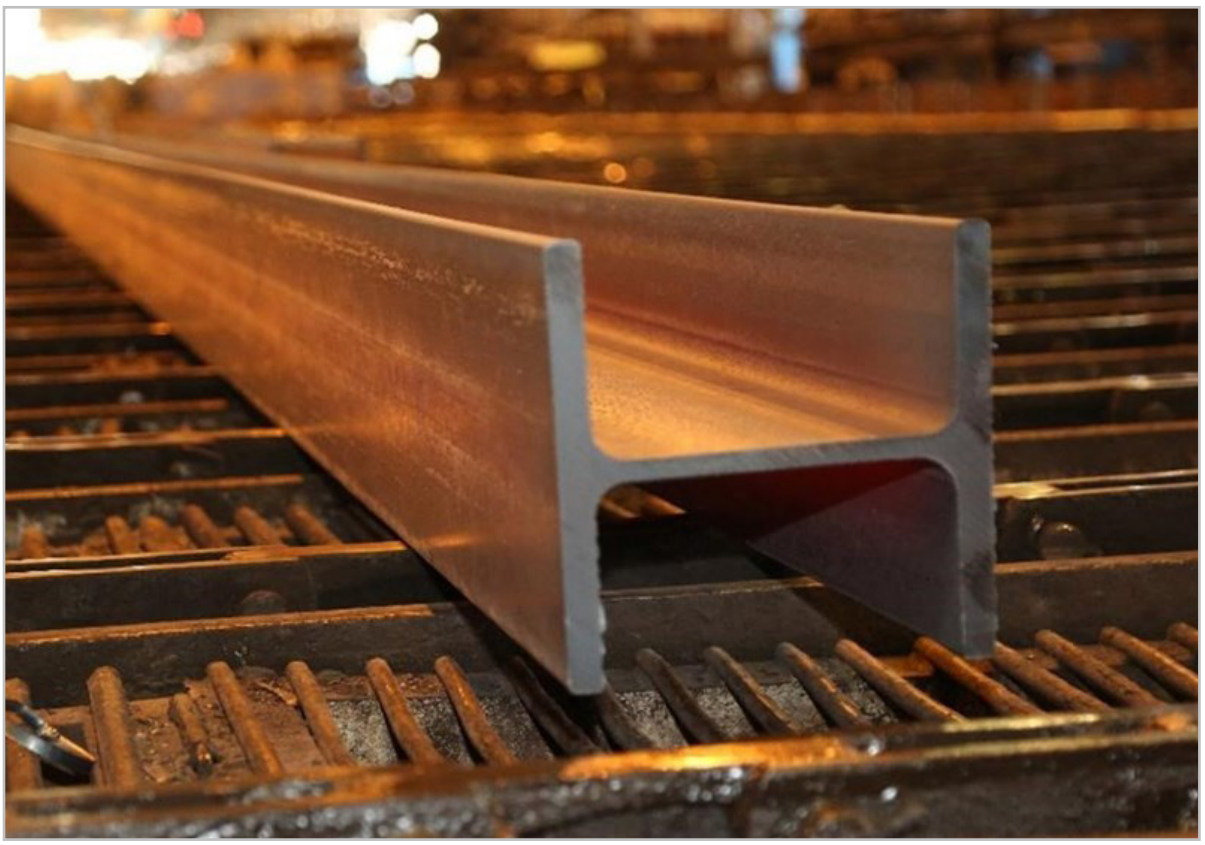


Table No. (1): Dimensional and weight specification of parallel wide flange beams (medium weight)

Size	Height (h) (mm)		Flange width (b) (mm)		Web thickness (s) (mm)		Flange thickness (t) (mm)		corners curvature radius r	Weight		
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance		Nominal weight (Kg/m)	(٪) Tolerance	
											Branch	Package or shipment
14	140	+3 -2	140	+ 4 - 2	7	± 1	12	+ 2.5 - 1.5	12	33.7	± 6	± 4
16	160		160		8		13		15	42.6		
18	180		180		8.5		14		15	51.2		
20	200	+4 - 2	200	± 4	9		15		18	61.3		
22	220		220		9.5		16		18	71.5		
24	240		240		10	± 1.5	17		21	83.2		
26	260		260		10		17.5		24	93		
30	300		300		11		19		27	117		

Table No. (2): Static values of parallel wing beams (medium weight)

Beam No.	Cross-sectional area F (Cm²)	Surface area of one meter U (m²)	Static values relative to bending axes						Moment of inertia of half section S_x (Cm³)	The distance between the center of tensile and compressive stresses S_x (Cm)
			X-X axes			Y-Y axes				
			Moment of inertia I_x (Cm⁴)	Section modulus w_x (Cm³)	Radius of gyration i_x (Cm)	Moment of inertia of half section I_y (Cm⁴)	Section modulus W_y (Cm³)	Radius of gyration i_y (Cm)		
14	43	0.805	1510	216	5.93	550	78.5	3.58	123	12.3
16	54.3	0.918	2490	311	6.78	889	111	4.05	177	14.1
18	65.3	1.04	3830	426	7.66	1360	151	4.57	241	15.9
20	78.1	1.15	5700	570	8.54	2000	200	5.07	321	17.7
22	91	1.27	8090	736	9.43	2840	258	5.59	414	19.6
24	106	1.38	11260	938	10.3	3920	327	6.08	527	21.4
26	118	1.50	14920	1150	11.2	5130	395	6.58	641	23.3
30	149	1.73	25170	1680	13	8560	571	7.58	934	26.9

Light-weight Wide Flange Beam (IPBL)

Based on Iran's national standard No.13781, Hot-rolled wide flange parallel beams with light weight (I-4) are produced in Esfahan Steel Company in accordance with IPB and DIN 1025-2 standards in dimensions, weight and static values, EN 10034 in tolerance, EN10025-2 in technical specification and chemical analysis, as follows:

Table No. (1): Dimensional and weight specification of parallel flange beams (light weight)

Size	Height (h) (mm)		Flange width (b) (mm)		Web thickness (s) (mm)		Flange thickness (t) (mm)		corners curvature radius r_1	Weight		
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance		Nominal weight (kg/m)	Weight Tolerance %	
											Branch	Package or shipment
14	133	+ 3 - 2	140	+ 4 - 2	5.5	± 0.7	8.5	+ 2 - 1	12	24.7	± 6	± 4
16	152		160		6		9		15	30.4		
18	171		180		6		9.5		15	35.5		
20	190	+ 4 - 2	200		6.5		10	+ 2.5 -1.5	18	42.3		
24	230		240	±۴	7.5	±۱	12		21	60.3		
30	290		300		8.5		14		27	88.3		

Table No. (2): static values of parallel flange beams (light weight)

Size	Cross-sectional area **F** (Cm²)	Surface area of one meter **U** (m²)	Static values relative to bending axes						Moment of inertia of half section **S_x** (Cm³)	The distance between the center of tensile and compressive stresses **s_x** (Cm)
			X-X axes			Y-Y axes				
			Moment of inertia **I_x** (Cm⁴)	Section modulus **w_x** (Cm³)	Radius of gyration **i_x** (Cm)	Moment of inertia **I_y** (Cm⁴)	Section modulus **W_y** (Cm³)	Radius of gyration **i_y** (Cm)		
14	31.4	0.794	1030	155	5.73	389	55.6	3.52	86.7	11.9
16	38.8	0.906	1670	220	6.57	616	76.9	3.98	123	13.6
18	45.3	1.02	2510	294	7.45	925	103	4.52	162	15.5
20	53.8	1.14	3690	389	8.28	1340	134	4.98	215	17.2
24	76.8	1.37	7760	675	10.1	2770	231	6.0	372	20.9
30	112	1.72	18260	1260	12.7	6310	421	7.49	692	26.4

Wide Parallel Flange Beam

Table No. 3: Chemical analysis of Wide Parallel Flange Beams (H-Beam)

Steel type	weight of element(٪)							C.E.(Max)
	C (Max)	**Si**	**Mn**	**S** (Max)	**P** (Max)	**N** (Max)	**Cu** (Max)	
S235JR (St-37)	0.19	0.12 – 0.35	1.50-0.25	0.045	0.045	0.014	0.55	0.35
S275JR (St-44)	0.23	0.15 – 0.45	0.40 – 1.60	0.045	0.045	0.014	0.55	0.40
S355JR (St-52)	0.26	≤ 0.60	≤ 1.70	0.045	0.045	0.014	0.55	0.45

Table No.4: Mechanical properties of Wide Parallel Flange Beams (H-Beam)

Steel type	Tensile test			Cold bending test under an angle of 180 degrees
	Minimum yield stress (N/mm^2)	Tensile Strengh (N/mm^2)	Minimum percentage of relative elongation $L_o = 5.65\sqrt{S_o}$	The diameter of the bending jaw relative to the thickness of the sample
S235JR (St-37)	235	360 - 510	26	1 t
S275JR (St-44)	275	410 - 560	23	2.5 t
S355JR (St-52)	355	470 - 630	22	2.5 t

Tapered Narrow Flange Beam

Based on the Iranian national standard No. 3277, Hot-rolled tapered narrow flange beams (I-1) are produced in Esfahan Steel Company, in accordance with DIN 1025-1 standards in dimensions, weight and static values, EN 10024 in tolerances, EN 10025-2 in terms of technical specification and chemical analysis, as follows:

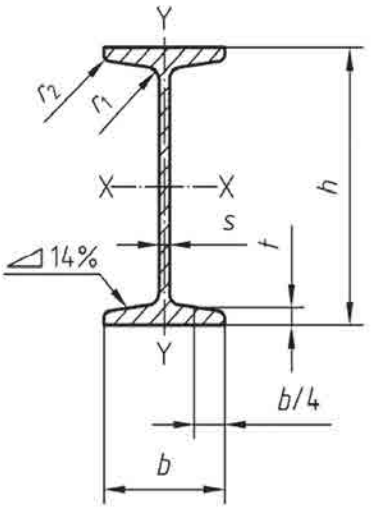


Table number (1): Dimensional, weight and tolerance specification of tapered narrow flange beams

Size	Height (h) (mm)		Flange width (b)(mm)		Web thickness (s) (mm)		Flange thickness (t) (mm)		corners curvature radius		Weight		
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	r_1	r_2	Nominal weight (Kg/m)	٪ Weight Tolerance	
												Branch	Package or shipment
12	120	± 2	58	± 1.5	5.1	+ 0.5 - 1.0	7.7	+ 2 - 1	5.1	3.1	11.1	± 6	± 4
14	140		66		5.7		8.6		5.7	3.4	14.3		
20	200		90	± 2	7.5	+ 0.7 - 1.5	11.3	+ 2.5 - 1.5	7.5	4.5	26.2		

Table No. (2): The size and static values of the tapered narrow Flange beams

Size	Cross-sectional area F (Cm^2)	Surface area of one meter U (m^2)	Static values relative to bending axes						Moment of inertia of half section S_x (Cm^3)	The distance between the center of tensile and compressive stresses s_x (Cm)
			X-X axis			Y-Y axis				
			Moment of inertia I_x (Cm^4)	Section modulus w_x (Cm^3)	Radius of gyration i_x (Cm)	Section modulus I_y (Cm^4)	Section modulus W_y (Cm^3)	Radius of gyration i_y (Cm)		
12	14.2	0.439	328	54.7	4.81	21.5	7.41	1.23	31.8	10.3
14	18.2	0.502	573	81.9	5.61	35.2	10.7	1.40	47.7	12.0
20	33.4	0.709	2140	214	8.0	117	26	1.87	125	17.2

Table No. (3): Chemical analysis of Tapered narrow flange beams

Steel type	weight of element(٪)						
	C (Max)	Si	Mn	P (Max)	S (Max)	N (Max)	C.E.(Max)
S235JR (St-37)	0.19	0.12 – 0.40	0.25 -1.50	0.050	0.050	0.014	0.35
S275JR (St-44)	0.24	0.15 – 0.45	0.40 -1.60	0.050	0.050	0.014	0.40
S355JR (St-52)	0.27	≤ 0.60	≤ 1.70	0.050	0.050	0.014	0.45

Table No. (4): Mechanical properties of tapered narrow flange beams

Steel type	Tensile test			Cold bending test under an angle of 180 degrees
	Yield Stress (N/mm^2)	Tensile Strengh (N/mm^2)	percentage of relative elongation $L_o = 5.65\sqrt{S_o}$	The diameter of the bending jaw relative to the thickness of the sample
S235JR (St-37)	235	360 – 510	26	1 t
S275JR (St-44)	275	410 – 560	23	2.5 t
S355JR (St-52)	355	470 - 630	22	2.5 t

Semi-wide Flange Beams (Semi-light weight) (I-7)

Based on the Iranian national standard No.16348, semi-light weight semi-wide parallel flange beams (I-7) are produced in Esfahan Steel Company, with following technical specifications, dimensional tolerance and chemical analysis:

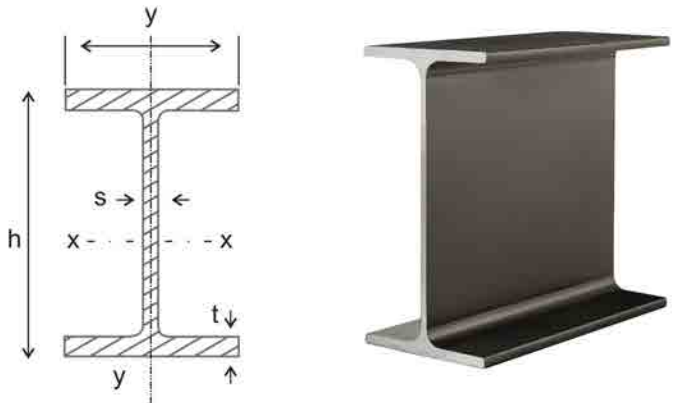


Table number (1): Dimensional and weight specification of semi-wide flange beams (semi-light)

Size	Height (h) (mm)		Flange width (b) (mm)		Web thickness (s)(mm)		Flange thickness (t) (mm)		corners curvature radius r	Nominal weight (Kg/m)	Tolerance (٪)
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance			Branch
14	140	+ 3 - 2	72	+ 4 - 1	4.1	±0.7	6.2	+ 1.5 - 0.5	7	11.4	± 4
16	160		81		4.7		6.6	+ 2 - 1	9	14.4	
18	180		90		5.3		7.2		9	17.6	
20	200	+ 4 - 2	99		5.7		7.3		12	20.6	

Table No. (2): Static values of semi-wide flange beams (semi-light weight)

Size	Cross-sectional area F (Cm²)	Surface area of one meter U (m²)	Static values relative to bending axes						Moment of inertia of half section S_x (Cm³)	The distance between the center of tensile and compressive stresses sp_x (Cm)
			X-X axis			Y-Y axis				
			Moment of inertia I_x (Cm⁴)	Section modulus w_x (Cm³)	Radius of gyration i_x (Cm)	Moment of inertia I_y (Cm⁴)	Section modulus W_y (Cm³)	Radius of gyration i_y (Cm)		
14	14.6	0.526	487	69.59	5.78	38.70	10.75	1.63	39.52	12.33
16	18.3	0.591	789	98.59	6.57	58.74	14.50	1.79	56.15	14.05
18	22.4	0.666	1214	134.89	7.36	87.86	19.52	1.98	76.96	15.77
20	26.3	0.726	1745	174.54	8.15	118.78	24.00	2.13	99.69	17.51

Table No. 3: Chemical analysis of semi-light semi-wide flange beams

Steel type	weight of element(٪)							C.E. (Max)
	C	Si	Mn	P	S	N	Cu	
Steel 275	0.21	-	1.6	0.040	0.040	0.014	0.60	0.40
Steel 295	0.23	0.55	1.6	0.035	0.035	0.014	0.60	0.45

Table No. (4): Mechanical properties of semi-wide flange beams (semi-light wight)

Steel type	Tensile test			the diameter of bending jaw relative to the : thickness of sample
	Minimum yield : stress Y.P (N/mm^2)	Tensile strength : U.T.S (N/mm^2)	minimum of : relative elongation percentage $L_o = 5.65\sqrt{S_o}$	
Steel 275	275	430 – 580	22	times more than the web thickness 2.5
Steel 295	295	430 - 630	22	times more than the web thickness 2.5

Rebars

Plain and ribbed rebars are produced in Esfahan Steel Company. Ribbed rebars are provided in two different types of ribs in accordance with Iranian National Standard No. 3132.

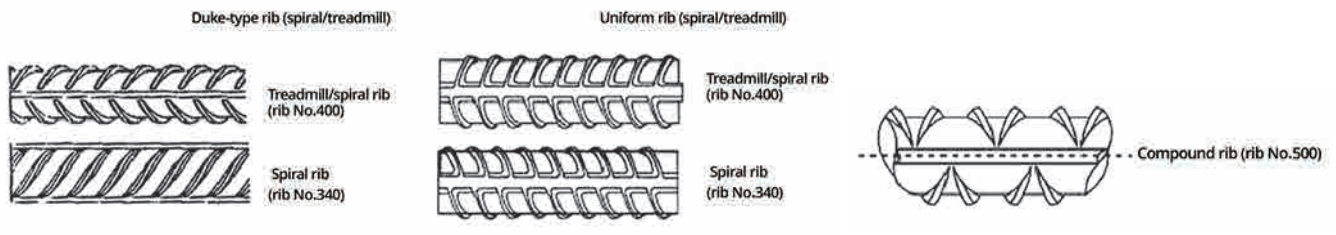


Table number (1): Dimensional and weight specification of rebars (plain and ribbed)

Nominal Diameter (mm)	Background diameter in uniform ribbed rebar 340 and 400 (mm)	Diameter tolerance (plain rebar- uniform ribbed rebar) (mm)	Transverse rib height (Uniform) (mm)	Tolerance	Longitudinal rib height with a maximum of 0.15 d Uniform (treadmill) (mm)	Computational weight of one meter (Kg) simple Ribbed (uniform, treadmill and compound)	Transverse rib height (mm)		Maximum transeverse rib width in middle (mm)	Tolerance (٪) Weight		Considerations
							In middle (min.)	In 1.4 (min.)		plain rebar	Ribbed rebar uniform) spiral, , (compound	
8	7.5	+ 0.3 - 0.5	0.75	±0.25	1.20	0.395	0.52	0.36	1.60	± 7	± 8	In calculations, steel product mass has considered as In plain rebars: the difference between min. and max. of diameter (ellipsoid) is within 70% of tolerance domain.
10	9.3		1.00	±0. 5	1.50	0.616	0.65	0.45	2.00	± 5	± 6	
12	11		1.25		1.80	0.888	0.78	0.54	2.40			
14	13		1.25		2.10	1.21	0.91	0.63	2.80		± 5	
16	15		1.50		2.40	1.58	1.04	0.72	3.20			
18	17		1.50		2.70	2.00	1.17	0.81	3.60			
20	19		1.50		3.00	2.47	1.30	0.90	4.00			
22	21	+ 0.4 - 0.5	1.50		3.30	2.98	1.43	0.99	4.40			
25	24		1.50		3.75	3.85	1.63	1.13	5.00	± 4	± 4	
28	26.5	+ 0.4 - 0.7	2.00	±0.7	4.20	4.83	1.82	1.26	5.60			
32	30.5		2.00		4.80	6.31	2.08	1.44	6.40			
36	34.5		2.50		5.40	7.99	2.34	1.62	7.20			

Table number (2): Chemical composition of produced rebars

Classification	Identification No.	Percentage of elements chemical composition (max. values)						C.E. (Max)
		C	Si	Mn	P	S	N	
Plain rebar	240 S	0.24	0.60	0.81	0.055	0.055	-	-
Spiral ribbed rebar	340 Ribbed	0.35	0.65	1.36	0.050	0.050	-	0.50
	350 Ribbed	0.30	0.60	1.66	0.045	0.045	0.014	0.51
Treadmill ribbed rebar	400 Ribbed	0.40	0.65	1.66	0.050	0.050	-	-
	420 Ribbed	0.33	0.60	1.56	0.045	0.045	0.014	0.56
Compound ribbed rebar	500 Ribbed	0.43	0.65	1.88	0.050	0.050	-	-
	520 Ribbed	0.35	0.60	1.88	0.045	0.045	0.014	0.61

In the welding of these rebars, the preheating conditions must be observed according to the contents of the Iranian National Standard No. 3132, at the time of usage.

Table number (3): Mechanical Properties of produced rebars

Classification	Identification No.	Tensile test					Cold bending test		
		Upper yield strength Y.P (N/mm^2)		Ultimate tensile strength U.T.S (N/mm^2)	Ratio of tensile strength to yield strength R_m/R_{eH}	Relative elongation (percentage) A5 %	retemaed waj gnidneB raber ot evitaler retemaed lanimon		
		At least	At least	At least	At least	At least	At least		
							d ≤ 16	≤ 16 < d 32	< 32 ≤ d 50
Plain rebar	240 S	240	-	360	1.25	25	3d	6d	7d
Spiral ribbed rebar	340 Ribbed	340	-	500		18			
	350 Ribbed	350	455	500		17			
Treadmill ribbed rebar	400 Ribbed	400	-	600		16			
	420 Ribbed	420	545	600		16			
Compound ribbed rebar	500 Ribbed	500	-	650		10			

d= nomina diameter of test sample

Specified bending jaw diameter in above table is for producer to implement the test. In order to bend the rebar during usage, please refer to the Iranian Concrete Manual.

The specification of the exported ribbed rebars produced under BS 4449 (2005) standard are according to the table below.			
Tolerances (%)	Weight of one-meter (kg)	Cross-sectional area (^{2}mm)	Nominal diameter (mm)
±4.5	0.888	113	12
	1.58	201	16
	2.47	314	20
	3.85	491	25
	6.31	804	32

Weight tolerance in any size is equal to -4,+6 percent of nominal weight

The specification of the exported ribbed rebars produced under ISO6935-2 standard are according to the table below.			
Weight tolerance (٪)	Weight (kg/m)	Cross-sectional area (mm^2)	Nominal diameter (mm)
±6	0.888	113	12
±5	1.21	154	14
±5	1.58	201	16
±5	2.47	314	20
±4	3.85	491	25
±4	4.84	616	28
±4	6.31	804	32

Chemical Compositions									
Standard	Classification	weight of element(٪)							C.E. (Max)
		C	**Si**	**Mn**	**P**	**S**	**N**	**Cu**	
ISO6935-2	B400A-R	-	-	-	0.060	0.060	-	-	-
	B500BWR	0.22	0.60	1.60	0.050	0.050	0.012	-	0.50
BS4449(2005)	B500B	0.22	0.60	-	0.050	0.050	0.012	0.80	0.50
	B500C								
DIN488	B500B	0.22	0.60	-	0.050	0.050	0.012	0.60	0.50

Mechanical Properties							
Standard	Classification	Tensile test					
		Upper yield strength Y.P (ˈ N/mm)		Ratio of tensile strength to upper yield strength Rm/ReH		Ratio of tensile strength to upper yield strength Re.act/ Rnom.	E Agt (min%)
		At least	Maximum	At least	Maximum	Maximum	At least
ISO6935-2	B400A-R	400	-	1.02	-	-	2
	B500BWR	500	-	1.08	-	-	5
BS4449(2005)	B500B	500	650	1.08	-	-	5
	B500C	500	650	1.15	1.35	-	7.5
DIN488	B500B	500	650	1.08	-	1.30	5

Wire rod

Coiled wire rod and industrial rebars produced by Esfahan Steel Company are prepared and provided according to the following table:

Table No. (1): Dimentional and weight specification of coiled wire rods

Wire rod diameter mm		Cross-sectional area (mm^2)	Weight (kg/m)	Deviation from the circular state (ellipticity)
Nominal diameter	tolerance			
5.5	± 0.4	23.76	0.187	For all sizes, up to 70% range of tolerance
6.5		33.18	0.260	
7		38.48	0.302	
7.5		44.18	0.347	
8		50.26	0.395	
9		63.62	0.499	
10		78.54	0.617	
11		95.03	0.746	
12		113.1	0.888	
14		153.9	1.21	

Size	Nominal diameter	Wight tolerance	Max ellipticity	Weight (m)	Wight tolerance
	(mm)	(mm)	(mm)	W(kg)	%
25	25	±0.6	0.9	3.85	±4
30	30	±0.6	0.9	5.55	
50	50	±0.8	1.2	15.4	
60	60	±1.5	2.4	22.2	
80	80	±2	2.5	39.44	

Table No. (3): chemical composition of coiled wire rod and industrial rebars

Steel grade	weight of element(٪)						
				Maximum value		Other elements	Type of product
	Carbon **C**	Silicon **Si**	Magnesium **Mn**	Phosphorus **P**	Solphur **S**		
RSt34-2	≤ 0.12	≤ 0.20	0.30 – 0.50	0.035	0.035	-	wire
USD-7	0.05 – 0.09	≤ 0.03	0.40 – 0.60	0.025	0.025	Al < 0.003	
RSD-7	0.05 – 0.10	0.05 – 0.10	0.35 – 0.55	0.025	0.025	-	
RSD11	0.08 – 0.14	0.25 – 0.30	0.50 – 0.70	0.025	0.020	-	
11MnSi6 (SG2)	0.06 – 0.13	0.70 – 1.00	1.30 – 1.60	0.025	0.025	Al ≤ 0.040	
10MnSi7 (SG3)	0.06 – 0.13	0.80 – 1.20	1.60 – 1.90	0.025	0.025	Cu ≤ 0.30	
11Mn4Si (S2)	0.07 – 0.15	≤ 0.15	0.80 – 1.20	0.025	0.025	-	
SWRH-27	0.24 – 0.31	0.15 – 0.35	0.30 – 0.50	0.035	0.035	-	
SWRH-67B	0.60 – 0.71	0.15 – 0.35	0.60 – 0.90	0.030	0.030	-	
C67	0.64 – 0.73	0.10 – 0.30	0.55 – 0.65	0.040	0.040	S + P ≤ 0.060	
SAE1008	≤ 0.10	≤ 0.20	0.30 – 0.50	0.040	0.050	-	
SAE1010	0.08 – 0.13	0.15 – 0.30	0.30 – 0.60	0.040	0.050		
SAE1012	0.10 – 0.15	0.15 – 0.35	0.30 – 0.60	0.040	0.050	-	
SAE1018	0.15 – 0.20	0.20 – 0.35	0.60 – 0.90	0.040	0.050	-	
SAE1020	0.18 – 0.23	0.15 – 0.35	0.30 – 0.60	0.040	0.050	-	
SAE1022	0.18 – 0.23	0.15 – 0.35	0.70 – 1.0	0.040	0.050	-	
S235JR	0.11 – 0.18	0.15 – 0.30	0.40 – 0.60	0.040	0.040	-	
CK45	0.42 – 0.50	0.15 – 0.40	0.50 – 0.80	0.035	0.035	-	branch rebar
70Cr2	0.65 – 0.80	0.15 – 0.30	0.75 – 0.95	0.040	0.035	= Cr 0.40 – 0.60	

Dimensional and technical conditions of industrial rebars with steel No. listed in the above table for a diameter of more than 14 mm are determined based on existing standards, customer requests and agreements made.

The production wires of Esfahan Steel Company are in two types, industrial and construction.

Angle

Based on the Iranian national standard No.13968-1, Hot-rolled equal angles are produced in Esfahan Steel Company, in accordance with EN10056-1&2 standards in dimensions, weight and static values and tolerances as well as EN10025-2 standard in technical specification and chemical analysis, as follows:

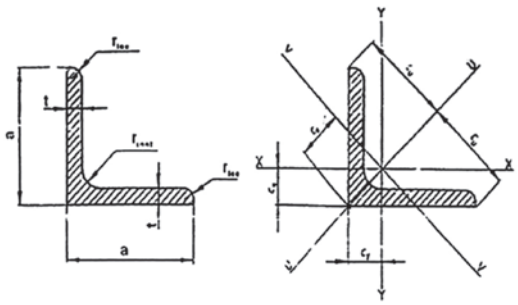


Table number (1): Dimensional, weight and tolerance specification related to equal angles

Size	Dimension and tolerance (mm)					Cross-sectional area F (cm^2)	Weight	
	Flange width (b)		Flange thickness (t)		R_{root}		Nominal weight (Kg/m)	Tolerance %
	Nominal value	Tolerance	Nominal value	Tolerance				
40 × 40 × 4	40	± 1	4	± 0.5	6	3.08	2.42	± 6
50 × 50 × 4	50		4		7	3.89	3.06	
50 × 50 × 5	50		5		7	4.80	3.77	
60 × 60 × 6	60	± 2	6	± 0.75	8	6.91	5.42	± 4
70 × 70 × 7	70		7		9	9.40	7.38	
80 × 80 × 8	80		8		10	12.3	9.63	
90 × 90 × 9	90		9		11	15.5	12.2	
100 × 100 × 10	100		10		12	19.2	15	
150 × 150 × 10	150	± 3	10		16	29.3	23	
150 × 150 × 12	150		12	± 1	16	34.8	27.3	

Table No. (2): Axes distance and static values of equal angles

Size	Distance of edges to the center of gravity			The characteristics of the axes of the angle cross-section							
				X-X=Y-Y			U-U		V-V		
	$C_x=C_y$ (cm)	C_u (cm)	C_v (cm)	Moment of inertia $I_x=I_y$ (Cm^4)	Radius of gyration $r_x=r_y$ (cm)	Section modulus $Z_x=Z_y$ (Cm^3)	Moment of inertia I_u (Cm^4)	Radius of gyration r_u (cm)	Moment of inertia I_v (Cm^4)	Radius of gyration r_v (cm)	Section modulus Z_v (Cm^3)
40 × 40 × 4	1.12	2.83	1.58	4.47	1.21	1.55	7.09	1.52	1.86	0.78	1.17
50 × 50 × 4	1.36	3.54	1.92	8.97	1.52	2.46	14.2	1.91	3.73	0.98	1.94
50 × 50 × 5	1.40	3.54	1.99	11.0	1.51	3.05	17.4	1.90	4.55	0.97	2.29
60 × 60 × 6	1.69	4.24	2.39	22.8	1.82	5.29	36.1	2.29	9.44	1.17	3.96
70 × 70 × 7	1.97	4.95	2.79	42.3	2.12	8.41	67.1	2.67	17.5	1.36	6.28
80 × 80 × 8	2.26	5.66	3.19	72.2	2.43	12.6	115	3.06	29.9	1.56	9.37
90 × 90 × 9	2.54	6.36	3.59	116	2.73	17.9	184	3.44	47.9	1.76	13.3
100 × 100 × 10	2.82	7.07	3.99	177	3.04	24.6	280	3.83	73.0	1.95	18.3
150 × 150 × 10	4.03	10.6	5.71	624	4.62	56.9	990	5.82	258	2.97	45.1
150 × 150 × 12	4.12	10.6	5.83	737	4.60	67.7	1170	5.80	303	2.95	52.0

Table No. (3): chemical composition of produced angles

Steel grade	weight of element(٪)							E.C. (Max)
	C (Max)	Si	Mn	S (Max)	P (Max)	N (Max)	Cu (Max)	
S235JR (St-37)	0.19	0.12 – 0.35	1.50-0.25	0.050	0.050	0.014	0.55	0.35
S275JR (St-44)	0.24	0.15 – 0.45	0.40 – 1.60	0.050	0.050	0.014	0.55	0.40
S355JR (St-52)	0.27	≤ 0.60	≤ 1.70	0.050	0.050	0.014	0.55	0.45

Table No. (4): mechanical property of produced angles

Steel grade	Tensile test			Cold bending test under the angle of 180 degree
	Minimum yield stress (N/mm^2)	Tensile strength (N/mm^2)	Minimum relative elongation (percentage) $L_o = 5.65\sqrt{S_o}$	Bending jaw diameter relative to thickness of sample
S235JR (St-37)	235	360 - 510	26	1 t
S275JR (St-44)	275	410 - 560	23	2.5 t
S355JR (St-52)	355	470 - 630	22	2.5 t

According to the new edition of the National Angles standard, the production of other steel grades mentioned in the EN10025 standards will be reviewable.

Channel

Based on the Iranian national standard No.4477-1 and No.4477-2, Hot-rolled tapered flange and parallel flange channels are produced in Esfahan Steel Company, in accordance with DIN1026, EN10279 and GOST8240 standards in dimensions, weight and static values and tolerances as well as EN10025-2 standard in technical specification and chemical analysis, as follows:

Parallel flange channels

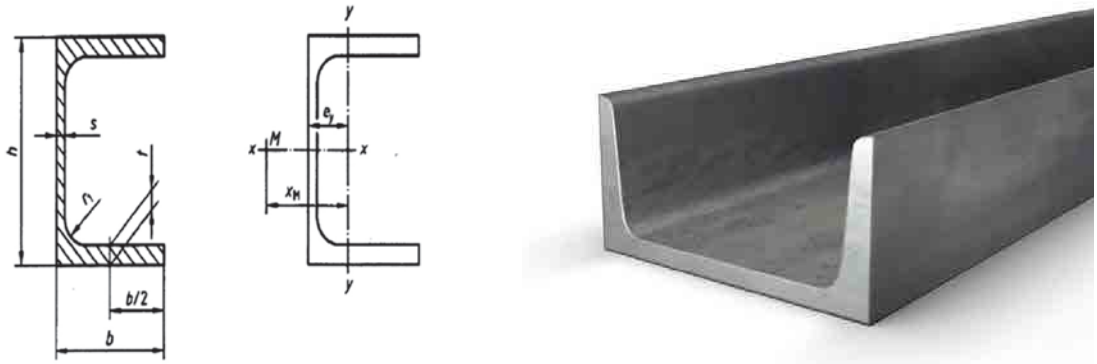


Table number (1): Dimensional and weight specification of parallel flange channels (light weight)

Size	Dimension and tolerance (mm)									Cross-sectional area	weight	
	Height (h)		Flange width (b)		(s) Web thickness		Flange thickness (t)		Bending curvature of corners			
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	r_1	A Cm^2	Nominal weight (Kg/m)	Tolerance (%)
12	120	± 2	52	± 2	4.8	± 0.5	7.8	-0.7	7.5	13.3	10.40	+3 -5
14	140		58		4.9		8.1		8.0	15.6	12.30	
16 × 6.4	160	± 2.5	64	± 2.5	5.0		8.4	-0.8	8.5	18.1	14.20	
16	160		68		5.0		9.0		8.5	19.5	15.30	
18 × 7	180		70		5.1		8.7		9.0	20.70	16.30	
18	180		74	± 3	5.1		9.3		9.0	22.20	17.40	
20	200	± 3	76		5.2		9.0		9.5	23.40	18.40	

Table No. (2): static values of parallel flange channels (light weight)

Size	Static values relative to bending axes						Moment of inertia of half section	Distance of cutting-surface center of M from Y-Y axes
	X-X axes			Y-Y axes				
	Moment of inertia J_x (Cm^4)	Section modulus w_x (Cm^3)	Radius of gyration i_x (Cm)	Moment of inertia J_y (Cm^4)	Section modulus W_y (Cm^3)	Radius of gyration i_y (Cm)	S_x (Cm^3)	X_M (cm)
12	305	50.8	4.79	34.90	9.84	1.62	29.70	1.66
14	493	70.4	5.61	51.50	12.90	1.81	40.90	1.82
16 × 6.4	750	93.8	6.44	72.80	16.40	2.00	54.30	1.97
16	827	103	6.51	90.50	19.60	2.15	59.50	2.19
18 × 7	1090	121	7.26	100	20.60	2.20	70.00	2.14
18	1200	133	7.34	123	24.30	2.35	76.30	2.36
20	1530	153	8.08	134	25.20	2.39	88.00	2.30

Table number (3): Dimensional and weight specification of parallel flange Channels (heavy weight)

Size	Dimension and tolerance (mm)									Cross-sectional area F (Cm^2)	External surface area U (m^2/m)	weight	
	Height (h)		Flange width (b)		Web thickness		Flange thickness (t)		r_1			Nominal weight of (Kg/m)	Tolerance (%)
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance					
12	120	± 2	60	± 2	5	± 0.5	8	-0.5	12	15.4	0.460	12.1	± 6
14	140		65		5		9		12	18.4	0.520	14.5	± 4
16	160		70		5.5		9.5		12	21.7	0.579	17	
18	180		75		5.5		10.5	-1.0	12	25.1	0.639	19.7	
20	200		80		6		11		13	29	0.697	22.8	

Table No. (4): static values of parallel flange channels (heavy weight)

Size	Static values relative to bending axes						Moment of inertia of half section	The distance between centers of tensile and compressive stresses	The distance from Y-Y axes	Distance of cutting-surface center of M from Y-Y axes
	X-X axes			Y-Y axes						
	Moment of inertia I_x (Cm^4)	Section modulus w_x Cm^3)	Radius of gyration i_x (Cm)	Moment of inertia I_y (Cm^4)	Section modulus W_y (Cm^3)	Radius of gyration i_y (Cm)	S_x (Cm^3)	s_x (Cm)	e_y (cm)	X_M (cm)
12	364	60.6	4.86	55.5	13.8	1.90	35.2	10.3	1.98	4.12
14	600	85.6	5.71	78.8	18.2	2.07	49.4	12.1	2.17	4.54
16	911	114	6.48	107	22.6	2.22	65.8	13.9	2.27	4.76
18	1350	150	7.34	144	28.6	2.39	86.5	15.7	2.47	5.19
20	1910	191	8.11	187	34.5	2.54	110	17.4	2.56	5.41

Channel

B) Tapered flange channels

Table number (1): Dimensional and weight specification of tapered flange channels (light-weight)

Size	Dimension and tolerance (mm)										Cross-sectional area F Cm^2	weight	
	Height (h)		Flange width (b)		Web thickness (s)		Flange thickness (t)		Bending curvature of corners r_1	Bending curvature of corners r_2		Nominal weight (Kg/m)	Tolerance (%)
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance					
12	120	± 2	52	± 2	4.8	± 0.5	7.8	-0.7	7.5	3	13.30	10.40	+3 -5
14	140		58		4.9		8.1		8	3	15.60	12.30	
6.4× 16	160	± 2.5	64	± 2.5	5		8.4	-0.8	8.5	3.5	18.10	14.20	
16	160		68		5		9		8.5	3.5	19.50	15.30	
7× 18	180		70		5.1		8.7		9	3.5	20.70	16.30	
18	180		74	± 3	5.1		9.3		9	3.5	22.20	17.40	
20	200	± 3	76		5.2		9		9.5	4	23.40	18.40	

Table No. (2): static values of light-weight tapered flange channels

Size	Static values relative to bending axes						Moment of inertia of half section S_x (Cm^3)	Distance of cutting-surface center of M from Y-Y axes X_M (cm)
	X-X axes			Y-Y axes				
	Moment of inertia I_x (Cm^4)	Section modulus w_x (Cm^3)	Radius of gyration i_x (Cm)	Moment of inertia I_y (Cm^4)	Section modulus W_y (Cm^3)	Radius of gyration i_y (Cm)		
12	304	50.6	4.78	31.20	8.52	1.53	29.60	1.54
14	491	70.2	5.60	45.40	11	1.70	40.80	1.67
16× 6.4	747	93.4	6.42	63.30	13.80	1.87	54.10	1.80
16	823	103	6.49	78.80	16.40	2.01	59.40	2
18× 7	1090	121	7.24	86	17	2.04	69.80	1.94
18	1190	132	7.32	105	20	2.18	76.10	2.13
20	1520	152	8.07	113	20.50	2.20	87.80	2.07

Table number (3): Dimensional and weight specification of tapered flange channels (heavy weight)

Size	Dimension and tolerance (mm)										Cross-sectional area F Cm²	weight	
	Height (h)		Flange width (b)		Web thickness		Flange thickness (t)		r_1	r_2		Nominal weight of (Kg/m)	Tolerance (%)
	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance	Nominal value	Tolerance					
12	120	± 2	55	± 2	7	± 0.5	9	-0.5	9	4.5	17	13.4	± 6
14	140		60		7		10		10	5	20.4	16	± 4
16	160		65		7.5		10.5	-1.0	10.5	5.5	24	18.8	
18	180		70		8		11		11	5.5	28	22	
20	200		75		8.5		11.5		11.5	6	32.2	25.3	

Table No. (4): static values of tapered flange channels (heavy weight)

Size	Static values relative to bending axes						Moment of inertia of half section	Distance between the center of compressive and tensile stresses	Distance from axis	Distance of cutting-surface center of M from Y-Y axes
	X-X axes			Y-Y axes						
	Moment of inertia I_x (Cm⁴)	Section modulus w_x (Cm³)	Radius of gyration i_x (Cm)	Moment of inertia I_y (Cm⁴)	Section modulus W_y (Cm³)	Radius of gyration i_y (Cm)	S_x (Cm³)	s_x (Cm)	y-y e_y (cm)	X_M (cm)
12	364	60.7	4.62	43.2	11.1	1.59	36.3	10.0	1.60	3.03
14	605	86.4	5.45	62.7	14.8	1.75	51.4	11.8	1.75	3.37
16	925	116	6.21	85.3	18.3	1.89	68.8	13.3	1.84	3.56
18	1350	150	6.95	114	22.4	2.02	89.6	15.1	1.92	3.75
20	1910	191	7.70	148	27.0	2.14	114	16.8	2.01	3.94

Channel

Chemical composition and mechanical properties of produced channels

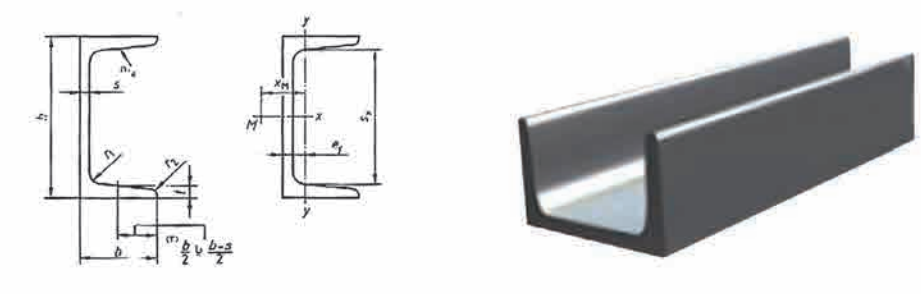


Table 1: chemical composition of produced channels

Steel grade	weight of element(%)						C.E. (Max)
	C (Max)	Si	Mn	S (Max)	P (Max)	N (Max)	
S235JR (St-37)	0.19	0.12 – 0.35	0.25 – 1.50	0.045	0.045	0.014	0.35
S275JR (St-44)	0.23	0.15 – 0.45	0.40 – 1.60	0.045	0.045	0.014	0.40
S355JR (St-52)	0.26	≤ 0.60	≤ 1.70	0.045	0.045	0.014	0.45

steel S235JR, S275JR and S355JR are equivalent to steel 37, 44 and 52 respectively in Iran's market

Table No. (2): mechanical property of produced channels

Steel grade	Tensile test			Cold bending test under the angle of 180 degree
	Minimum yield stress (N/mm^2)	Tensile strength (N/mm^2)	Minimum relative elongation (percentage) $L_o = 5.65\sqrt{S_o}$	Bending jaw diameter relative to thickness of sample
S235JR (St-37)	235	360-510	26	1 t
S275JR (St-44)	275	410-560	23	2.5 t
S355JR (St-52)	355	470-630	22	2.5 t

Steel Structure Sheets

Applications of steel structure sheets:

1- Base plate
2- Beam's web and flange reinforcement
3- As a connection in steel structures
4- Tanks reinforcement
5- Steel shear wall fabrication
6- Sheet beaem fabrication
7- Steel workshop building
8- Steel bridge construction

Table N0. (1): Dimensional Specification of Steel Structure Sheets

Steel structure sheets	width (mm)	tolerance (mm)	thickness (mm)	tolerance (mm)
15 × 200 20 × 200 25 × 200	200 200 200	± 1.2	15 20 25	± 0.75
10 × 250 12 × 250 15 × 250 20 × 250 25 × 250	250 250 250 250 250		15 20 25	
10 × 300 12 × 300 15 × 300 20 × 300 25 × 300	300 300 300 300 300		10 12 15 20 25	

Table No. (2): Chemichal analysis of produced sheets

Steel grade	weight of element(٪)						C.E. (Max)
	C (Max)	**Si**	**Mn**	**S** (Max)	**P** (Max)	**N** (Max)	
S235JR (St-37)	0.19	0.12-0.35	0.25-1.5	0.045	0.045	0.014	0.35

Table No. (3): mechanical property of produced Sheets

Steel grade	Tensile test			Cold bending test under the angle of 180 degree
	Minimum yield stress (N/mm^2)	Tensile strength (N/mm^2)	Minimum relative elongation (percentage)S $L_o = 5.65\sqrt{S_o}$	Bending jaw diameter relative to thickness of sample
S235JR (St-37)	235	360-510	26	1 t

above-mentioned width, having the thickness more than 25 mm can be produced based on customer order and agreement

Various billets/Bloom

Billets/blooms produced by Esfahan Steel Company are according to the table No. 1.

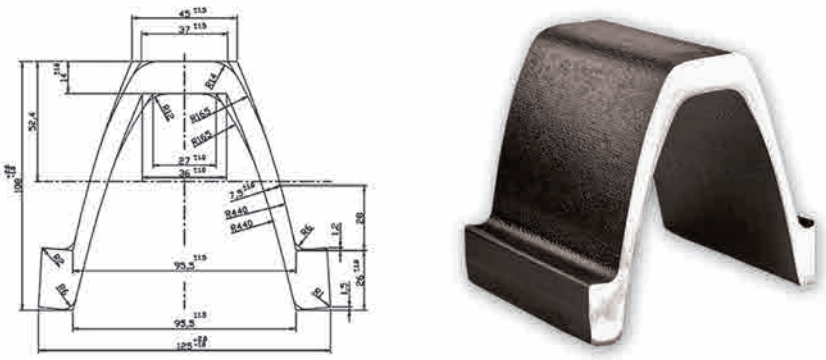
Billets/Blooms having section 100x100, 125x125, 130x130, 150x150, 200x200, 250x250, 320x250 (mm), can be produced in Esfahan Steel Company with length varying from 4 to 12 meters. In case of agreement in advance, production would be based on chemical analysis and other specification required by the customer.

Table No. (1): Chemical composition of some of the steel grade produced by Esfahan Steel Company

Steel grade	Weight of elements (٪)							
	C	**Si**	**Mn**	Max **S**	Max **P**	Max **N**	Max **Ceq**	Other elements
S235JR	≤ 0.17	≤ 0.35	≤ 1.40	0.040	0.040	0.012	0.35	
S275JR	≤ 0.21	0.15-0.40	≤ 1.50	0.040	0.040	0.012	0.40	
S355JR	≤ 0.24	≤ 0.55	≤ 1.50	0.035	0.035	0.012	0.45	
CT-1SP	0.06-0.12	0.15-0.35	0.25-0.50	0.050	0.040			
CT-2SP	0.09-0.15	0.15-0.35	0.25-0.50	0.050	0.040			
CT-3SP	0.14-0.22	0.15-0.35	0.40-0.65	0.050	0.040			
CT-4SP	0.18-0.27	0.15-0.35	0.40-0.70	0.050	0.040			
CT-5SP	0.28-0.37	0.15-0.35	0.50-0.80	0.050	0.040	-		
RSt34-2	≤ 0.12	≤ 0.20	0.30-0.50	0.035	0.035	-		
RSt37-2	0.10-0.20	0.12-0.35	0.30-0.75	0.050	0.050			
RSt44-2	0.14-0.22	0.15-0.45	0.45-0.75	0.050	0.050			
28Mn4	0.23-0.34	0.17-0.43	0.86-1.25	0.050	0.050		0.50	
31Mn5	0.26-0.37	0.32-0.58	0.96-1.36	0.050	0.050			
34Mn5	0.28-0.38	0.37-0.58	1.24-1.61	0.050	0.050			
C82D	0.80-0.85	0.10-0.30	0.50-0.80	0.035	0.035			
C67	0.64-0.73	0.10-0.30	0.55-0.65	0.040	0.040			≤S+P 0.060
USD-7	0.05-0.09	≤ 0.030	0.40-0.60	0.025	0.025			≤AL 0.003
RSD-7	0.05-0.10	0.05-0.10	0.35-0.55	0.025	0.025			≤Cr 0.40
C45	0.40-0.52	0.12-0.38	0.44-0.84	0.045	0.045			≤Cr 0.25
CK45	0.43-0.50	0.15-0.40	0.50-0.80	0.035	0.035			≤Cr 0.40
70Cr2	0.65-0.80	0.15-0.30	0.75-0.95	0.035	0.025			Cr=0.40-0.60
900A	0.60-0.80	0.10-0.50	0.80-1.30	0.040	0.040			
SAE1008	≤ 0.10	≤ 0.20	0.30-0.50	0.050	0.040			
SAE1010	0.08-0.13	0.15-0.30	0.30-0.60	0.050	0.040			
SAE1012	0.10-0.15	0.15-0.35	0.30-0.60	0.050	0.040			
SAE1018	0.15-0.20	≤ 0.35	0.60-0.90	0.050	0.040			
SAE1020	0.18-0.23	0.15-0.35	0.30-0.60	0.050	0.040			
SAE1022	0.18-0.23	0.15-0.35	0.70-1.00	0.050	0.030			
11Mn4Si	0.07-0.15	≤ 0.15	0.80-1.20	0.025	0.025			
10MnSi7	0.06-0.13	0.80-1.20	1.60-1.90	0.025	0.025			≤Cu 0.30
11MnSi6	0.06-0.13	0.70-1.00	1.30-1.60	0.025	0.025			≤AL 0.040
36Mn6Si	0.30-0.42	0.57-0.93	1.34-1.76	0.050	0.050		0.65	
RSD11	0.08-0.14	0.25-0.30	0.50-0.70	0.020	0.025			
SWRH-27	0.24-0.31	0.15-0.35	0.30-0.50	0.035	0.035			
SWRH-67B	0.62-0.71	0.15-0.35	0.60-0.90	0.030	0.030			
C72D2	0.68-0.75	0.15-0.30	0.70-0.85	0.030	0.030			AL: max 0.008
C82D2	0.74-.089	0.15-0.30	0.40-0.65	0.030	0.030			AL: max 0.008
C82D2+Cr	0.74-0.89	0.17-0.30	0.70-0.85	0.030	0.030			AL: max 0.008 Cr : 0.35-0.42
3SP/PS	0.18-0.22	0.15-0.30	0.60-0.80	0.050	0.045	0.012		
3SP-M	0.18-0.22	0.15-0.30	0.70-0.90	0.045	0.040	0.012		
3SP	0.14-0.22	0.15-0.35	0.40-0.65	0.050	0.040	0.012		
3SP-M2	0.19-0.23	0.15-0.35	0.80-1.00	0.045	0.045	0.012		
3SP-M3	0.18-0.23	0.15-0.30	0.40-0.65	0.045	0.040	0.012		
3SP-M4	0.14-0.22	0.15-0.30	0.50-0.70	0.050	0.045	0.012		
4SP	0.20-0.27	0.15-0.35	0.60-0.80	0.050	0.050	0.012		
4SP-M	0.18-.0.25	0.15-0.35	0.50-0.70	0.050	0.045	0.012		
4SP-M1	0.24-0.30	0.15-0.35	0.60-0.90	0.050	0.045	0.012		
4SP-M2	0.19-0.24	0.15-0.30	0.70-0.90	0.045	0.045	0.012		
4SP-M3	0.22-0.27	0.15-0.35	0.60-0.80	0.050	0.045	0.012		
5SP	0.28-0.37	0.15-0.35	0.60-0.90	0.050	0.045	0.012		
5SP-M	0.29-0.34	0.15-0.30	0.70-0.90	0.050	0.040	0.012		
5SP-M1	0.30-0.36	0.15-0.30	Min 1.20	0.045	0.045	0.012		
5SP-M2	0.28-0.37	0.15-0.30	0.70-0.90	0.045	0.045	0.012		
5SP-M3	0.28-0.34	0.15-0.30	Min 0.80	0.050	0.045	0.012		
B500B	0.18-0.22	0.15-0.30	0.60-0.80	0.050	0.050	0.012		
R260	0.62-0.80	0.15-0.58	0.70-1.20	0.025	0.025	0.90		H≤2.5PPM O-TOTAL≤20ppm
R0700	0.40-0.60	0.15-0.30	0.80-1.25	0.045	0.045	0.012		
C60	0.57-0.65	0.10-0.30	0.60-0.90	0.030	0.030	0.90		
R0550	0.20-0.40	0.15-0.35	0.60-1.10	0.040	0.040			

Mine Arc

The TH29 and TH36 Mine Arcs are produced based on DIN21530 Standard or customer's requirements. Also V21 Mine Arc is produced according to following specifications.



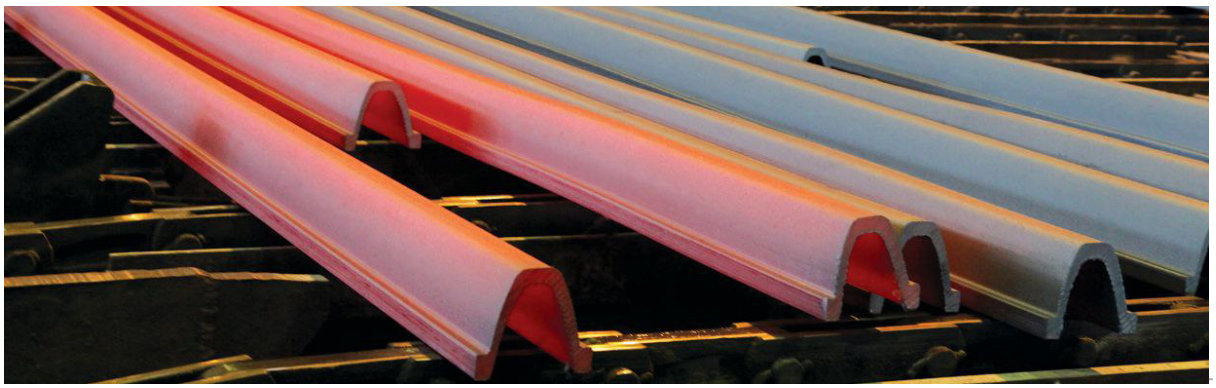


Table No. (1): Chemical Composion of Arc

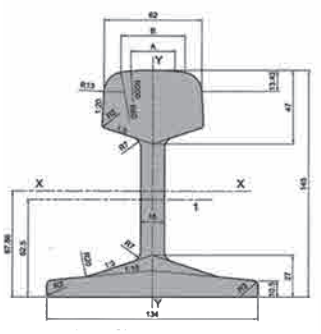
Mine Arc	Steel Grade	weight of element(٪)				
		C	Mn	Si	P	S
V21	ST-55	0.30-0.40	0.45-0.85	Max 0.35	Max 0.050	Max 0.050
TH29	31Mn4	0.26-0.38	0.76-1.14	0.17-0.53	Max 0.040	Max 0.040
TH36						

Table No. (2): mechanical property of produced Arc

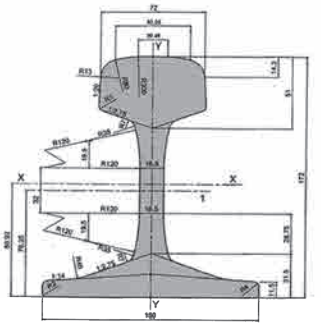
Steel grade	Minimum yield Strength(Mpa)	Minimum tensile strength(Mpa)	Minimum relative elongation (percentage)	Minimum Impact Energy
ST-55	340	550	17	30
31Mn4	350	550	18	30

Rail

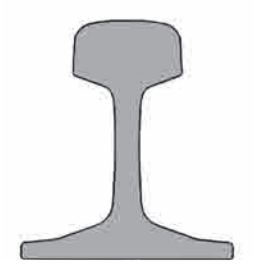
Various railway and subway rails including 46E2, 49E1, 54E1, 60E1, are produced in Esfahan Steel Company according to EN13674-1 or INSO22669-1 Standard or 860 UIC Code.



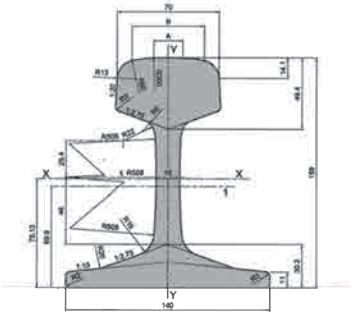
Rail profile:46E2
Mass:46.27kg/m
Rail Length:12-36m



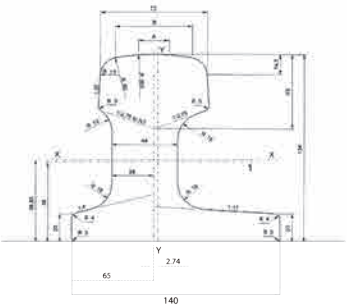
Rail profile:60E1
Mass:60.21kg/m
Rail Length:12-36m



Rail profile:49E1
Mass:49 kg/m
Rail Length:12-36m



Rail profile:54E1
Mass:54.77kg/m
Rail Length:12-36m



Rail profile:60E1A1
Mass:72.97 kg/m
Rail Length:12-36m

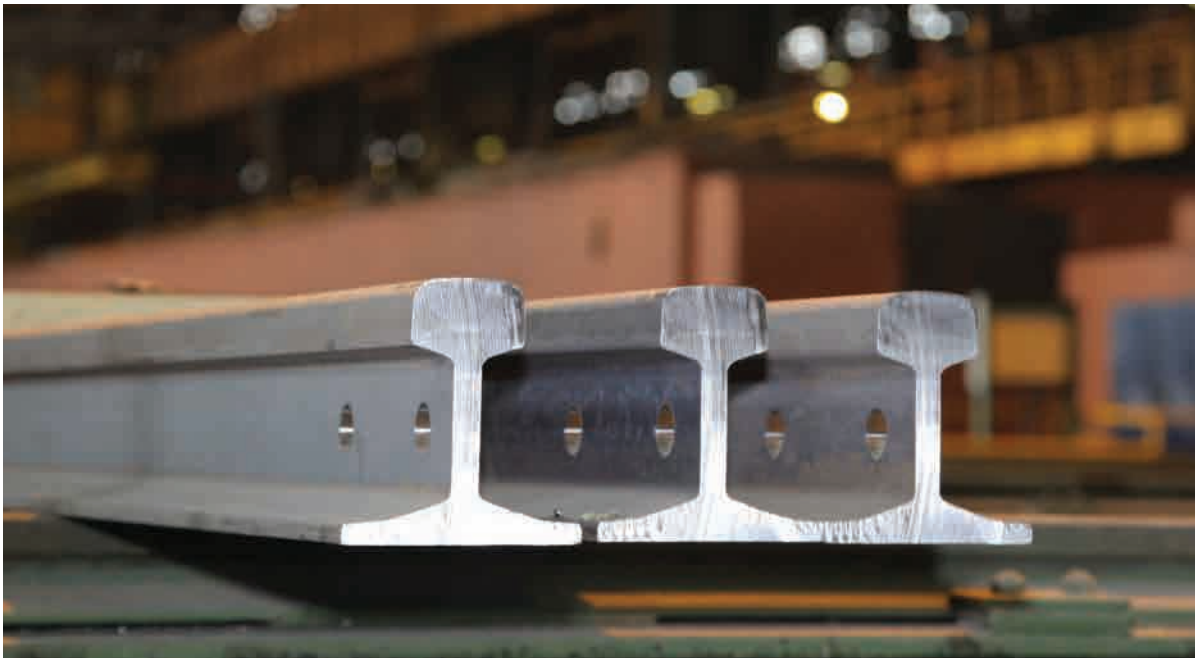


Table No. (1): chemical composion of rail Steel

Steel Grade	weight of element(٪)								
	C	Si	Mn	P (Max)	S (Max)	Cr (Max)	Al (Max)	V (Max)	N (Max)
R260	0.60-0.82	0.13-0.60	0.65-1.25	0.030	0.030	0.15	0.004	0.030	0.010
900A	0.60-0.80	0.10-0.50	0.80-1.30	0.040	0.040	-	-	-	-

Table No. (2): Mechanical Property of rail steel

Steel grade	Mechanical properties		
	Hardness (HBW)	Tensile strength (N/mm^2)	Min Elony ation(%)
R260	260-300	880	10
900A	-	880-1030	10

By products/ Agglomeration plant

The weight of each cast iron ingot is mainly in the range of 23-18kg, maximum 26 kg with the maximum di mensions of 95 x 240 x 280 mm .

Fine coke

Screening (mm)	Sulfur wt%	Ash wt%	Volatile matter wt%
5-15	≤ 1.2	16-19	≤ 2.5
20-30	≤ 1.2	15-17	≤ 2.0

Baked lime Specification

Product name	% CaO
Electrofilter micronized lime	≥ 70
Pulverized lime	≥ 90
Baked lime0-10 mm	≥ 90
Baked lime0-60 mm	≥ 90
Baked lime0-80 mm	≥ 90

By Products/ Blast furnace plant

Blast Furnace Slag (Percentage)

	SiO_2	CaO	FeO	MgO	S	MnO	Al_2O_3	TiO_2	Screening
Blast Furnace No.1 and No.2 Slag	34-38	33-38	0.4-0.6	7-11	1-2	0.7-2.0	10-14	0.5-2.0	0-4 mm $\geq$ 85%
Blast Furnace No.3 Slag	34-38	33-38	0.4-0.6	7-11	1-2	0.7-2.0	10-14	0.5-2.0	0-2 mm $\geq$ 90%

Blast Furnace dust

C	CaO	T.Fe	SiO_2	L . O . I	H_2O
10-24	3-10	30-48	8-21	15-28	3-18

Cast Iron Ingot

P	S	Si	Mn	C
Avg 0.2	Avg 0.07	Max 1.0	Max 1.1	3.5 – 5.0

By-products, coke making and chemicals products

Solid sulfur specification

Purity	≥ 99.0 %

Sulfuric acid specification

Acid concentration	Mass H_2SO_4	Wt%	90.0 % min
Iron (٪)	Fe	Wt%	0.02 % max

Coal tar specifications

Test standard			
ASTM D12792	(Density)	gr/cm3	1.10-1.20
ASTM D370	(Water Content)	Wt%	5.0 max
	(insoluble in toluene)	Wt%	3-8
ASTM D2415	(Ash)	Wt%	0.2 max
	(Naphtalene)	Wt%	5 min
ASTM D4715	(Coke Value)	Wt%	20-28

Ammonium sulfate specification

Test standard ISIRI 1605	Nitrogen (N_2)	Wt%	20.5 min
	Moisture (H_2O)	Wt%	0.3 max
	Sulfuric acid (H_2SO_4)	Wt%	0.15 max

By product/ coke making and chemical plant

Raw benzoyl specification

(Appearance)		yellow color
(Density)	(gr/cm3)	0.865-0.885
(Initial Boiling Point)	° C	70 min
(Boiling point at 90% dis.)	° C	171.0 max

Benzene, toluene and xylene specification

Standard	specifications	Benzene	Toluene	xylene
ASTM D248	Appearance	clear	clear	clear
ASTM D12792	(Density)	0.875-0.886	0.864-0.868	0.855-0.870
ASTM D850	initial boiling point	79 min	109 min	137 min
ASTM D850	Last boiling point in 95% distillation	81 max	111 max	143 max
ASTM D848	Acidity color	3 max	3 max	5 max
ASTM D847	State (acidity)	neutral	neutral	neutral
	Distillation range	1°C max	1°C max	4.5°C max

By products/ steel making plant

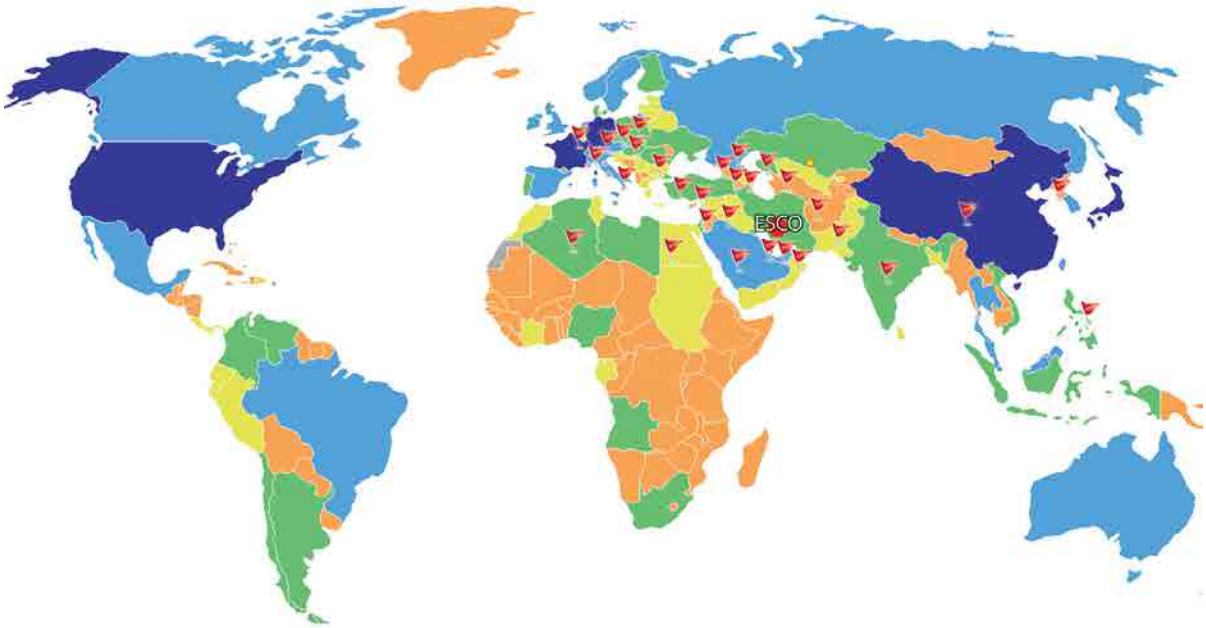
Convertor slag specification (٪)

SiO2	9-11
MnO	2-5
Al2O3	0.7-1.4
CaO	50-57
MgO	2-4
V2O5	2.0-3.0
P2O5	2.3-3.2
TFe	10-15
FeO	10-14
TiO2	2.0-3.0

Convertor industrial sludge specification (٪)

TFe	50-60
FeO	7-15
SiO2	1.5-3.0
CaO	5-13
MgO	0.5-1.0
Al2O3	0.1-1.0
MnO	1.0-2.5
S	0.1-0.2

Export destination of Esfan Steel company's products



Iranian National Quality Award

Quality management system certificate
ISO 9001 / ISO14001
ISO 450001

Iranian national standard in the quality of produced products
Eminent production unit in Iranian standard

Customer rights observance certificate

Superior company in Iran mercantile exchange

National Productivity and Organizational Excellence Award

Eminent exporter in Iran

- Spain
- Italy
- Belgium
- Irland
- Portugal
- South Korea
- Greece
- Poland
- Czech Republic
- Slovakia
- France
- Algeria
- Lebenan
- Iraq
- Kuwait
- Emirates United Arab
- Saudi Arabia
- Qatar
- Oman
- Egypt
- Afganistan
- Pakistan
- Turkmenistan
- Georgia
- Tadzhikistan
- Azerbaijan
- Turkey
- Philippines
- India
- China

Educational, social, sports and green space activities of Esfahan Steel Company

- Zob Ahan Sport and Cultural Club, superior in Iran, prominent in the world
- Shahid Motahari Hospital of Esfahan Steel Company
- Human assets training consistent with ISO10015 international standard
- Creation and retaining of more than 16,500 hectares of green space
- (84 times more than required standard green space for an industrial complex with a similar size)
- With minimal water consumption, 14,500 hectares are rain fed and 2,000 hectares using treated effluents.
- In the construction of these projects, products of Esfahan Steel Company (ESCO) have been used.

Zob Ahan Cultural and Sports Club of Esfahan, the best in Iran, presented in the world

Human resources training of Esfahan iron smelter with ISO10015 international standard

With minimal water consumption, 14,500 hectares are rain fed and 2,000 hectares are irrigating using treated effluents. In the construction of these projects, products of Esfahan Steel Company (ESCO) have been used.

Tehran›s Sadr Bridge

Asalouye power plant

Athens Olympic Stadium

Bushehr power plant

Construct with
C o n f i d e n c e .

National Rail,
National Pride.