

Marine (1898) Department.

G.O., No.

601 Mar

DATED

12 July 98

R F 405 made 11-52

[Despatch Abstract.]

Indian-made Articles of Iron & Steel

From: Civil Dept. Communicating resolution
of the Govt of India regarding the purchase for
the public service of —, + directing its
replication in the Fort St George Gazette, Com.
Re: India to the Port Office.

18/7/98

G.O.	No.	Department.	Date.	G.O.	No.	Department.	Date.
80.	405	Wear	11.5.99				
CNO 146/08							

Communicating to the departments of the Secretariat resolution of the Government of India regarding the purchase for the public service of —, and directing the republication of the same in the *Port St. George Gazette*.

GOVERNMENT OF MADRAS.

FINANCIAL DEPARTMENT.

Read—again the following paper:—

G.O., No. 604, Financial, dated 17th July 1891.

Read—also the following papers:—

G.O., No. 1905 W., dated 1st July 1892.

" " 984 W. " 26th April 1895.

Resolution of the Government of India, Finance and Commerce Department (Accounts and Finance—Stores), dated Simla, 9th June 1898, No. 2587 S.R.

Read—again the Resolutions of the Government of India cited below stating the conditions on which articles of iron and steel made in India may be purchased for the public service:

- (1) In the Finance and Commerce Department, No. 2650, dated the 25th June 1891.
- (2) In the Public Works Department, No. 226 M., dated the 14th June 1892.
- (3) In the Finance and Commerce Department, No. 1426 S.R., dated the 25th March 1895.

Read—also the correspondence cited below relating to objections taken by certain manufacturing firms in India to some of the conditions and limitations prescribed in the resolutions cited above:

- (1) Despatch from the Government of India in the Finance and Commerce Department, to the Secretary of State for India, No. 113, dated the 8th May 1895.
- (2) Despatch from the Secretary of State for India (with enclosures), to the Government of India, No. 15 (Financial—Stores), dated the 21st November 1895.
- (3) Despatch from the Government of India in the Finance and Commerce Department, to the Secretary of State for India, No. 63, dated the 11th March 1896.
- (4) Letter (with its enclosures) No. 50 W., dated the 5th October 1896, from the Secretary of the Engineering and Iron Trades Association, Calcutta.

The Governor-General in Council has decided, after careful consideration, (a) that the list of articles of iron and steel manufactured in India from imported material, which may be purchased locally, may be considerably extended, and (b) that the condition limiting such purchases to articles, the certain want of which could not be anticipated and the delay in the supply of which might involve loss, may be dispensed with.

2. His Excellency in Council is accordingly pleased to direct that the portions of Resolution No. 2650 of June 25th, 1891, and of Resolution No. 1426 of March 25th, 1895, which impose the condition mentioned in clause (b) of the preceding paragraph shall be cancelled.

3. Articles required for State Railways under construction should continue, as at present, to be supplied by indent on England as a general rule, and in the absence of the express permission of the Government of India to purchase locally; and the same course should be followed in dealing with the first equipment of large engineering projects other than State Railways. In all other cases supplies of articles of the descriptions specified in the list A appended to this Resolution, manufactured in India from imported materials, may be procured as required in India subject to the following restrictions:—

- (a) That the firms permitted to tender for supply shall for the present be those specified in Appendix B, the list being subject to revision from time to time.
- (b) That any firm tendering for the supply of such articles shall state the names of the makers from whom the iron or steel used in the manufacture of each such article was obtained, and shall also state the character and commercial name of the metal.
- (c) That the raw material and the manufactured articles shall pass the tests prescribed in Appendix C.
- (d) That the articles supplied as of local manufacture shall not have been imported into India in a finished or partly-finished state.
- (e) That the price is not in excess of that at which similar articles of equal quality could be obtained by indent on the Secretary of State.
- (f) That the quality of the manufactured article is not inferior to that of English supplies.

4. Nothing in this resolution is to be taken as interfering with the discretion of Local Governments in regard to the employment of the agency of Government workshops for the manufacture of articles required for the public service or as implying that tenders must be called for in all cases from the firms named, or as restricting the power of officers receiving tenders to reject any or all of them as they may think fit.

5. Nothing in this resolution is to be read as restricting the purchase locally of articles manufactured in India from material produced in the country or of any articles the certain want of which could not have been anticipated and delay in the supply of which might involve loss.

Order.—Ordered that this resolution be communicated to the Local Governments and Administrations noted on the margin, for information and guidance.

The Governments of Madras, Bombay, Bengal, [the North-Western Provinces and Oudh, Punjab and Burma, The Chief Commissioners of the Central Provinces, Assam, Mysore and Coorg, The Resident at Hyderabad, The Agents to the Governor-General in Central India, Rajputana and Baluchistan.

Ordered also, that copy be forwarded to the Military and Public Works Departments, and that it be published in the Supplement to the *Gazette of India*.

(Signed) W. S. MEYER,
for Offg. Secretary to the Govt. of India.

[Appendix.

APPENDIX A.

LIST of Articles which may be made up in India from imported Raw Material, subject to the restrictions specified in paragraph 3 of the Resolution.

Roof trusses of any span, with purlins, etc.
 Cast-iron columns of any size.
 Curved roofs of galvanized corrugated-iron sheets.
 Iron work for timber trusses.
 Cast-iron and galvanized wrought-iron gutters and rain-water pipes.
 Road bridges of spans up to 150 feet.
 Railway bridges of spans up to 80 feet.
 Overbridges for railways.
 Well curbs.
 Caissons.
 Suspension rods and bond rings for wells.
 Buckled and arched plates for bridge flooring.
 Cast-iron cylinders for bridge piers.
 Wrought and cast iron screw piles for piers and jetties.
 Superstructure iron work for piers and jetties.
 Hydraulic bridge and lock gear.
 Dredgers of all size.
 Iron work for timber bridges.
 Petty iron work, such as pile shoes and rings, holding-down bolts, etc.
 River steamers and flats.
 Steam launches.
 Lighters and barges.
 Horizontal and vertical steam boilers, constructed under Government inspection.
 Iron chimneys, with cast-iron base plates.
 Shafting, wall boxes, plumber blocks, and driving pulleys.
 Cast-iron sockets and anchor plates for telegraph posts.
 Brackets and spandrils of cast-iron.
 Castings for general purposes.
 Forgings of iron and steel.
 Pit-head gear.
 Pumps.
 Looms.
 Ploughs and agricultural implements.
 Safes, treasure chests and treasury doors.
 Buoys.
 Culvert pipes of galvanized corrugated iron.
 Boring tools.
 Latrines.
 Carts for conservancy and road-watering.
 Railings and gates of wrought and cast iron.
 Tanks " " "
 Lamp-posts, cast-iron.
 Sluice gates and frames of wrought or cast iron, with lifting gear; also iron work and gear for timber gates.
 Stand posts and equipment for water-works.
 Hose couplings and hand-pipes.
 Air valves.
 Lifting machinery, crab winches, pulley blocks.
 Water wheels.
 Windmills.
 Road-rollers, not including steam road-rollers.
 All parts of wire fencing except the wire.
 Signals and interlocking gear.
 Signal winches.

Workshop stores, when urgently required.
 Trollies, material and inspection.
 Trolly wheels and axles.
 Mining tubs and buckets.
 Asphalte boilers.
 Smith's fires, cast-iron cupolas.
 Iron cisterns.
 Dobbin carts.
 Hand-pipe driving engines (all necessary iron work).
 Grapnels and anchors.
 Small mortar mills.
 Concrete skips.
 Small cupolas.
 Hand foundry ladles.
 Cold and hot sets of chisels.
 Rivetters' and blacksmiths' tools.
 Latelayers' tools.
 Contractors' pumps.

APPENDIX B.

LIST of Firms entitled to tender for the Supply of Articles of Iron and Steel of Local Manufacture.

In the Bengal Presidency.

- | | |
|---|----------------|
| 1. The Bengal Iron and Steel Company (Limited), Barrakar. | |
| 2. Messrs. Burn & Co. | |
| 3. " Jessop & Co. | } of Calcutta. |
| 4. " John King & Co. | |
| 5. " Parry & Co. | |
| 6. " Ahmuty & Co. | |
| 7. " Martin & Co. | |

In the Bombay Presidency.

- | | |
|-----------------------------|---------------|
| 8. Messrs. G. Gahagan & Co. | } of Bombay. |
| 9. " Richardson & Cruddas | |
| 10. " Cosser & Co. | } of Karachi. |
| 11. " McKenzie & Co. | |

In the Madras Presidency.

- | | |
|--------------------------|--------------|
| 12. Messrs. Massey & Co. | } of Madras. |
| 13. " Oakes & Co. | |
| 14. " Borham & Co. | |

In Burma.

15. Mr. D. D. Coath, A.M.I.C.E., Rangoon Foundry.
 16. The Irrawaddy Flotilla Company (Limited).

In the North-Western Provinces.

17. Messrs. T. Crowley & Co. of Allahabad.

APPENDIX C.

SPECIFICATION OF WROUGHT-IRON WORK OF BRIDGES, TRUSSES, ETC.

Materials.

The wrought-iron is to be well and cleanly rolled to the full sections shown on the drawing or in the specification and free from scales, blisters, laminations, cracked edges and defects of every sort, and the name of the maker is to be rolled or stamped on every piece.

2. It must be of such strength and quality as to be equal to the following tensional strains, and to indicate the following percentages of contraction of the tested area at the point of fracture and percentages of elongation:—

	Tensional stresses per square inch.	Percentage of contraction of fractured area.	Percentages of elongations in a length of 10 inches.
Round and square bars and flat bars under 6 inches wide ..	24	20	15
Angle T or other bars, and flat bars 6 inches wide and upwards ..	22	15	12
Plates	21	10	8
Plates across grain	18	5	4

The rivet iron must be of such a quality that any rivet will stand the following tests without showing signs of failure:—

Bending double upon itself whilst cold.

Bending double upon itself whilst red hot.

The shank being nicked whilst cold and bent double, showing the fibre of the iron to be of good quality.

Flattening down the head whilst red hot until its diameter is equal to $2\frac{1}{2}$ times that of the shank, without showing any signs of cracking at the edges.

Punching through the shank when at a red heat, with a taper punch, a round hole the diameter of the rivet, without showing signs of cracking or splitting.

The tests are to be conducted at the works of the contractor or elsewhere, or both, as may be determined by the inspecting officer. The expense of the tests is to be borne as provided for in the conditions of contract.

No material is to be used which, in the opinion of the inspecting officer, falls short of the tests and other requirements of the specification, and no iron except of British or Indian manufacture is to be used throughout the contract.

Firms tendering are required to submit with their tenders the names of the manufacturers, and the market name of the iron they propose to use.

Manufacture.

3. It is to be expressly understood that the greatest accuracy is to be observed in every part of the work, a main object of the designs being to facilitate as much as possible the erection of the work by perfection of workmanship. All corresponding parts of all spans or trusses must be made exactly similar and interchangeable.

4. All plates and bars must be rolled to the full sections, and the angle T channel or other bars to the full widths and weights per foot, shown on the drawings. All bars which do not hold their full widths and weights from end to end, or which have rough, jagged, or imperfect edges or ends, will be rejected.

5. All plates, flat bars, and angle T channel or other bars must be carefully levelled and straightened (the angle T channel or other bars by pressure and not by hammering) before and after they are punched or drilled. All edges of all plates, and the ends of all angle irons and bars, must be planed dead true to the dimensions, or, where planing is impossible, they must be dressed off fair with hammer, chisel and file. No rough edges fresh from the shears will be permitted anywhere throughout the work.

6. All rivet holes to be filled in the field are to be *drilled*.

All other rivet holes may be either drilled or punched, at the option of the contractor, but any plate or bar in which the holes are not accurately in place will be rejected. The holes through which any one rivet passes must correspond in any number of plates or bars.

Although the word "rivets" may be used on the drawings, the rivet *holes* are to be made the sizes figured, and in no case must the diameter of the rivet be more than $\frac{1}{8}$ inch less than the diameter of the hole it has to fill. All loose rivets, and rivets with cracked, badly formed, or deficient heads, must be cut out and replaced by others. Rivets must also be cut out when required for the examination of the work. All work intended to be riveted or bolted together must be absolutely in contact all over the whole surface.

All rivets, unless otherwise specified, are to be cup-headed at each end, and the heads are to contain not less than $1\frac{1}{4}$ diameters of the rivet.

Whenever necessary for the division of the work for transport, the rivets are to be left out, but the holes in all cases must be drilled ready for riveting, and all the requisite rivets, including the spare rivets, must be sent with the iron work.

7. In all cover plates, except in webs of plate girders, the fibre of the iron must run in the direction of the length of the span.

All plates must be shaped to the full sizes shown on the drawings, and any plate in which the rivet holes have been drilled nearer to the edge than shown on the drawings will be rejected.

Where cover plates are used to connect plates of different thicknesses, so much of the covers must be planed down as will make them fit fairly over the joint, no packing plates being allowed. The figured dimensions on the drawings show the different thicknesses after the cover plates have been planed down.

8. The main girders of all spans above 20 feet are to be built with a camber in the arc of a circle, the upper members being proportionately longer than the lower. The extent of the camber is in each case figured on the drawing.

The ends of all plates, etc., must be chipped and filed so as to butt with perfect accuracy over the whole of the meeting surfaces to the true radius necessary for the specified camber, and any joint which fails to form a perfect butt all over will involve the rejection of the length or lengths of the members which cannot be made to fit without being shortened.

Girders of 20 feet span and under are to be without camber.

9. The underside of the bearing plates of all main girders must be perfectly level and the rivets countersunk.

All bed plates are to be absolutely flat, and the guiding edges planed and truly parallel.

10. All bolts are to be screwed to Whitworth's standard thread, and all nuts must fit too tightly to be turned by hand. The heads and nuts for all timber bolts (except where otherwise shown on the drawings) and service bolts are to be square; for other bolts they are to be hexagonal.

The head and body of all bolts are to be forged out of one piece of rod or bar iron. All bolts are to be screwed for a length of three diameters.

Completion of Work and Erection.

11. All the spans are to be temporarily erected complete, so that accuracy of fit and perfection of workmanship may be assured.

As the work is erected, all the holes which are left to be riveted in the field must be filled at one and the same time by temporary bolts $\frac{1}{8}$ inch less in diameter than the holes which they fill firmly screwed or keyed up. It will not be sufficient that bolts shall be placed in a certain number of holes only at a time, nor will it be sufficient that only such a number of bolts shall be inserted as may temporarily hold the span together.

Painting, Marking, etc.

12. The whole of the iron work, with the exception of the bolts and rivets, is to be scraped perfectly free from rust, scale and dirt, and then brushed all over with boiling hot linseed oil. It is afterwards to be painted with two coats of good oil paint, the first being of red lead and the second of Roman ochre, or other colours to be specially approved by the inspecting officer. Wherever plates or bars are to be riveted together, the surfaces that will be in contact are to be thoroughly cleaned immediately before plating, and one of them is to be covered with a good coat of red lead paint.

One end of every case is to be painted the same colour as the span for which its contents are intended.

The bolts (including the service bolts) and rivets are to be heated to the temperature of melted lead, and then dipped into boiled linseed oil.

13. Every portion of every span is to be very distinctly stenciled with paint and marked with the punch for guidance in erection, and every piece or bundle of iron is to be similarly marked, and every packing case branded, with such marks as the inspecting officer may require.

All parts of the work are to be stamped with the letters "I. S. R." or such other letters as may be ordered.

A neat casting bearing the name of the manufacturer, with place and date of manufacture, is to be bolted conspicuously on every span of main girders, and on every truss.

SPECIFICATION OF STEEL WORK FOR BRIDGES, TRUSSES, ETC.

Materials.

The steel is to be well and cleanly rolled to the full sections shown on the drawings or named in the specification and free from scales, blisters, laminations, cracked edges and defects of every sort, and the name of the maker, and the distinguishing number of the plate or bar are to be rolled or stamped on every piece. The names of the makers from whom it is proposed to obtain the steel are to be submitted for approval to the inspecting officer.

2. The steel must be of such strength and quality as to be equal to the following tensional stresses, and to indicate the following percentages of elongation:—

	Tensional stresses per square inch.	Percentages of elongation in a length of 10 inches.
	Tons.	
Steel in plates, either with or across the grain, and in angle or other bars, not less than	27	20
Or more than	31	
Steel rods for rivets and bolts not less than	25	25
Or more than	28	

3. Strips of steel, whether cut lengthwise or crosswise of any plate or bar heated to a low cherry red, and cooled in water at a temperature of 82° Fahrenheit, must stand bending double round a curve of which the diameter is not more than three times the thickness of the piece tested. In addition to this, angle and other bars must stand the test known at Lloyd's as the ram's horn test.

4. All rivets and bolts are to be of steel, and the steel used for them must be ingot steel of a special quality, and the rivets and bolts must stand bending double, both hot and cold, and also flattening down from the head, without showing cracks or other defects.

Side and end shearings must be taken as samples from every plate and flat bar and from as many angle, T, channel, and other bars as the inspecting officer shall require. At least 20 per cent. of the samples so taken will be tested for tensile strength, and the whole of them for bending in the manner described above; but it is

to be distinctly understood that power is reserved to test every plate and bar for tensile strength if the inspecting officer thinks fit; also that such power will be exercised in the event of there being, in his opinion, any indication that the material supplied is not equal in every respect to the requirements or intentions of this specification. For this purpose each sample must bear a number stamped to the satisfaction of the inspecting officer corresponding to the plate or bar from which it is taken, and all samples must be kept until the completion of the contract.

In addition to the above tests, samples of the steel supplied for use will be from time to time chemically examined; and should such examination show the presence of silicon, phosphorus or sulphur to a greater extent than 0.06 per cent. of any one of them, no further supplies of steel will be accepted from the makers of the bad sample until the inspecting officer is satisfied that, in future supplies, the percentages of silicon, phosphorus and sulphur will be reduced so as not to exceed the maximum limit.

The above tests are to be conducted at the works of the contractor or elsewhere, or both as may be determined by the inspecting officer. The expense of the tests and analysis is to be borne as provided for in the conditions of contract.

No plate or bar is to be annealed or otherwise manipulated after leaving the rolls without the special authority of the inspecting officer and his approval of the process employed, and when annealing is permitted, the test pieces are not to be cut off till the annealing is completed.

No material is to be used which, in the opinion of the inspecting officer, falls short of the tests and other requirements of the specification.

Firms tendering are required to submit with their tender the names of the makers from whom they propose to obtain the steel, and the character of the steel to be employed, i.e., whether Bessemer acid or Open Hearth acid. The latter is preferred. Basic steel will not be accepted for girder or roof work. In the event of the acceptance of their tender, it will be upon the understanding that the steel will actually be obtained from such firms, unless written permission be given to the contrary.

Manufacture.

5. All plates and bars must be carefully levelled and straightened (*by pressure and not by hammering*) before and after they are punched or drilled. Every sheared edge, whether of a plate or bar, must have at least $\frac{1}{8}$ th of an inch taken off it by machine or by the chisel, and any plate or bar too small to leave $\frac{1}{8}$ th of an inch for planing or chipping on every sheared edge will be rejected.

6. All holes are to be drilled, but the contractor may, if he think proper, first punch a smaller hole of such diameter in each case as to leave at least $\frac{1}{8}$ inch of material all round to be subsequently drilled out; thus the *punched* hole intended to be enlarged to $\frac{3}{4}$ inch must not exceed at the largest end $\frac{1}{2}$ inch in diameter. When punched holes are thus drilled out, the punching must be so accurate that when the work is put together before drilling, a rivet, $\frac{1}{2}$ inch less in diameter than the size of the punched hole, can be easily passed through all the holes. All burrs left by the drill are to be completely removed. All punched holes are to be marked off with a centre punch and punched with a nipple punch.

All riveting is to be done by hydraulic, steam, or other machines of approved construction, and all rivet heads are to project through the holes before closing not less than $1\frac{3}{8}$ diameters for those closed at the works, and $1\frac{1}{2}$ diameters for those to be closed in the field, a further and sufficient allowance for filling the hole being also made when the rivet passes through more than two plates or bars.

Except when this specification differs from that for wrought-iron work the latter is to be followed.

GENERAL SPECIFICATION FOR CAST IRON.

The cast iron used is to be a mixture of soft grey iron. A proportion of scrap approved by the inspecting officer may be used, and no pig iron except of British or

Indian manufacture is to be used in any part of the contract. Firms tendering are required to submit with their tenders the names of the manufacturers and the market name of the pig iron which they propose to use.

2. The contractor must cast twice each day from the same metal from which the articles are cast (a) two bars 2 inches $\times$ 1 inch $\times$ 3 feet 6 inches long, cast with the broader side uppermost, and (b) two bars exactly 1 inch square in the middle for a length of 1½ inches, with ends of suitable shape for holding in a testing machine.

One of the bars (a) must be tested on edge on bearings 3 feet apart, and it must bear a weight of 30 cwts. in the centre without breaking, and must give a deflection of at least 0.3 inch. One of the bars (b) is to be tested in a suitable machine, to be approved by the inspecting officer, to ascertain the tensile strength of the iron, which must be at least 10 tons per square inch.

The second of each of the bars, (a) and (b), is to be marked with the date of the casting and put away for subsequent inspection.

Should either of the two bars, (a) or (b), tested for transverse or tensile strength, fail to stand the specified tests, all articles cast on any date represented by such test will be rejected.

3. All castings must agree in dimensions and thickness of metal with the drawings. As a general rule no casting will be accepted which is more than 5 per cent. lighter or more than 10 per cent. heavier than the weight due to the dimensions on the drawings. In the case of articles which are lighter, only the actual weight delivered will be paid for; in the case of articles which are heavier, only the weight due to the dimensions on the drawings will be paid for.

4. All castings must be sharp and clean, free from all blow-holes, honey-combing, broken surface, lumps, box parting ridges, and other defects, and when cold must be thoroughly dressed with chisel and file. Immediately after each article is cast, it must be protected in such a manner that its strength may not in any way be diminished by too rapid or unequal cooling. Pipes or columns must be cast vertically, and socket pipes with the socket end downwards.

5. Each casting will have on it the contractor's name (or such abbreviation of it as may be approved), the year, and such other letters as may be required. In addition to this it must have on it marks to show the pattern used, and the month and day on which it was cast.

6. When a large number of similar articles are required, the contractor will, as a rule, be required to supply at least two samples of the articles complete within days from the date of order, and no articles are to be cast for delivery until these two samples have been approved. Where several patterns are used for the same article, each pattern must have on it a distinguishing mark, and a sample cast from each pattern must be supplied and approved.

7. The contractor will be required to supply such templates, gauges, etc., as may, in the opinion of the inspecting officer, be necessary for testing the accuracy of the castings. For cast-iron sleepers when a pair of rails of the prescribed pattern are keyed up in them with the standard tiebars, cotters, etc., the gauge must in no case be less than the exact amount prescribed nor exceed the exact amount by more than ¼th of an inch; for either sleepers or chairs, the inclination of the rail must not vary from that prescribed by more than ½ per cent., that is, if the prescribed inclination be 1 in 20, or 5 per cent., it must not be less than 4½ nor exceed 5½ per cent. In the case of pipes or columns, the core must not at any part exceed ¼th of an inch out of centre.

8. Cast-iron sleepers or chairs will be subjected to a drop test as follows. A piece of rail, 18 inches long, is to be keyed up in the sleeper or chair, the chair will be secured to a sleeper, 3 feet long, 10 inches wide and 5 inches deep, of either teak, sal, or deodar; the cast-iron sleeper, or the timber sleeper and chair, with the rail fixed in it will then be laid on a bed of sand, 2 feet thick, supporting the sleeper evenly all over, and laid on a cast-iron bed plate, 8 inches thick. When in position the rail will be stuck by a monkey weighing 420 lb. falling from a height commencing at 2 feet and rising by successive increments of 1 foot up to 7 feet, and

whenever any chair or sleeper does not bear these blows without cracking or showing other signs of failure, all the sleepers or chairs cast on the same day will be rejected.

When not less than one per cent. of the total number are tested in this manner, the test prescribed in paragraph 2 may be dispensed with.

Pipes or columns are to be tested up to a pressure of 200 lb. per square inch and whilst under pressure are to be thoroughly sounded with a hammer suitably proportioned to their strength, and should any leakage occur they will be rejected.

When pipes have turned and bored or faced joints, a few lengths are to be put together and tested under the above pressure.

ORDER—No. 554, Financial, dated 22nd June 1898.

Communicated to the departments of the Secretariat.

2. The resolution will be republished in the Fort St. George Gazette.

(True Extract.)

A. K. Russell
Chief Secretary.

To all Departments of the Secretariat.
the Accountant-General.
Gazette.