COMPLETE PRODUCTS DESCRIPTION

BUREAU OF INDIAN STANDARDS (BIS)

Our national standards body, Which is inspecting and certifying our products and

controlling the process.

BODY MATERIAL MANUFACTURES: - We are buying materials (body steel) from the following sources.

a) SAIL : Steel Authority of India Limited

b) ESSAR : Essar steels

c) TISCO : Tata Iron and Steel Company

d) LLOYD : Lloyd steels

e) ISPAT : Ispat India Ltd.,

f) IMPORTED : Imported steels

Body Steel Bsi Specification

IS: 6240

Sheet Specification

2.9mm x 1100mm x 2000mm

2.9mm = Thickness of sheet

1100mm = Width of sheet

2000mm = Length of sheet

- Cast number shall be printed on every sheet. - What is CAST number: - Cast number (somebody calls it as Heat number) is nothing

but the batch number followed by steel manufactures at the time of heat treatment. - After the purchase of steel and during unloading from lorry, we must check for the

following:- a) Invoice number and date

b) Quantity of steel printed in Invoice and test certificate

c) Wagon number in invoice and test certificate

d) Test certificate number

e) Cast number, tonnage and physical and chemical properties values

f) Sheet specification

g) Check for the actual sheet specifications

h) Check for visual surface defects.

IS:9639

Reference standard for visual inspection of newly manufactured LPG cylinders

- The following are the surface defects to be verified visually before accepting the

sheet: Dig, Metal cut, Pit marks Laminations.

Dig:- A sharp impression where the surface material has not been penetrated.

Cut:- A sharp impression where the surface material has been penetrated.

Pit marks :- An indentation formed by the scale on the raw material during rolling operation.

Lamination:- Appearance of successive metallic layers on the surface

- The accepted (passed) materials shall be entered in the raw material release record

maintained by Q.A department and obtain the permission from BIS inspecting officer

in writing for using to further process. - Each cast number shall vary with physical and chemical properties within the range

given in Indian Standards. IS:6240 . - Hence we must ensure the non-mixing of cast numbers with one another. Hence we

must give different colour code to identify different cast numbers thus avoiding

mixing. - Example:- Any cylinder mixed with a different cast number means (upper halve one

cast number (colour) and lower halve other cast number (colour) , the upper halve

differed with physical and chemical properties with lower halve.

- When we select the particular cylinder for AT sample, the cylinder may fail due to

non-matching of physical and chemical properties of upper and lower part. - The failure and re-test criteria is gives in heat treatment process.The inspection report

should carry date, number of circles made, rejections, reworks, reason for the same,

cast number, colour code etc...

SHEARING: - Each cast number after identification by colour, shall cut into 8 equal parts called square.

The procedure and inspection details are given in the respective stage process sheet, work

instructions inspection instructions and quality plan.

The inspection report carries date, number of sheets cut, number of squares made

rejections, reworks, reason for the same, cast number, colour code, etc., CIRCLE CUTTING:- Each square plates has been converted into circular plates during the operation.

Size of circle plate = 615-617mm. There shall be a flat portion in the starting and finishing portion. It should be controlled

by less than 50mm.

If the flat portion exceeds 50mm, it may crack the halve during deep drawing operation.

The width of flat portion can be adjusted by adjusting the depth of cut.

There shall not be more than one flat portion in a circle plate. This can be controlled by

adjusting the stopper plate, used for positioning the square plate to the center.

The procedure and inspection details are given in the respective stage process sheet, work

instruction, inspection and quality plan.

Deep Drawing:- The 3 main tools used in deep drawing process are:

a) Punch b) Die c) Pressure pad

The circle plate is fed and get the shape of punch called halve.

Two halves make a cylinder.

- The following are the dimensions of halve:-

ID : 314.4 + 1%

- 0%

Height : 244-247mm

Minimum thickness : 2.43mm

Ovality/circularity : 3.14mm

Bung hole diameter : 52.0 +0.3mm

Deviation from center: 2mm

Possible defects during the process are:

Wrinkles, sheet cracks, die marks, laminations, metal cut, bend, tear off.. etc...

Check for trimming straightness and edge preparation.

Edge preparation angle shall be 30 degrees and free from burrs.

The halve height is fixed, based on the volume the halve with respect to the required

water capacity.

The halve height can be adjusted accordingly to suit the volume but within the range

given in the height.

Defects like tear-off, lamination and sheet crack shall be rejected.

The defects other than the above shall be removed by grinding and check for minimum

thickness requirements. If it ensures minimum thickness it can be accepted, otherwise

rejected.

Use DD compound during deep drawing operation. Apply this on 2 sides of cirlcle plate

before feeding. DD compound is a type of soap solution, that controls the heat generated

during this operation. Further it ensures no friction and makes the circle plate to flow

freely.

Make bung hole on 50% of the halves quantity.

Check for bung hole concentricity. It shall be at the center and maximum deviation of

hole is 2mm from the center.

Use a special gauge/fixture for measuring the exact deviation.

The procedure and inspection details are given in the respective process sheet, work

instructions, inspection instructions and quality plan.

The inspection report carries date, number of halves accepted, rejections, reworks, reason

for the same, cast number, colour code, internal diameter, height and minimum thickness

found, bung hole diameter and deviation of bung hole from center, name of inspection

personal etc..,

The following are the definitions for the possible surface defects during the operation:-

i) Lamination: - appearance of successive metallic layers on the cylinder wall.

ii) Sliver :- portion of metal peeled out due to defect in the raw material

iii) Wrinkles :- Localized undulations or uneven surface similar to corrugations in

Diameter at the straight portion of the cylinder, halve or dished ends.

iv) Dig :- A sharp impression where the surface material has not been penetrated.

v) Cut :- A sharp impression where the surface material has been penetrated.

vi) Dent :- A blunt impression where the surface material has not been penetrated.

vii) Die mark :- Identification formed during drawing operation due to foreign particles

Adhering to the die.

Halves inspection:- Remove the burrs from trimming edge with help of AG-7 grinder using disc wheel.

Since it may cause injury to the person in cleaning operation, ensure all halves for

burring.

Clean the halve with hot caustic soda solution and subsequently by nirma solution, plain

water and cotton waste.

Check for its dimensions and surface defects.

The nature of surface defects, its definitions are already given in deep drawing operation.

The reworks shall be performed carefully using AG-7 grinding machine and finally

checked for its minimum thickness requirements.

The rejections shall be holed and shifted to the specified area for storing rejections.

The procedure and inspection details are given in the respective process sheet, work

Instructions, inspection instructions and quality plan.

The inspection report carries date, number of halves accepted, rejected, reworked, reason

for the same, cast number, colour code, internal diameter, height, minimum thickness

found, bung hole diameter, deviation of bung hole from centre name of the

inspection personnel etc...,

Foot ring:-

IS:1079

Grade `O’ steel for manufacture of footring.

Obtain BIS officer permission for using the steel.

Specificaction :- 1250X2500X2.8mm.

Follow the procedure as given for body steel till getting permission from BIS office.

Dimensional details are:- Height : 265  3

J- form radius : 44 2

J- form radius : 8mm

Number of drain holes : 16mm

Diameter of drain hole : 5mm

Number of ventilation holes : 6

Size of ventilations holes : Dia 12mm (BPC)

: 20x 11 mm (HPC)

: 27x12 mm(IOC)

Markings:-

j) license number

k) Customer identification

 BPC-BHARAT GAS

 HPC-HP GAS

 IOC-INDANE\

The thickness of footings sheet , shall not be less than minimum declared wall thickness

of cylinder.

Ventilation holes:-

It helps to drain or remove the water that entered into the J-form radius

It helps to avoid corroding the footring

Footring welding:- Keep the plain halves over the fixture and ensure proper seating of halve in the groove

given the fixture.

Ensure proper cleanliness of footring.

Put the footring is positioned concentric to the halve.

Make continuous welding of at least 40 mm in 6 places equi-distance using a weld

current 120-150 amps.

Remove the weld flux and spatters.

Check the distance between bottom of footring and bottom of halves is at least 10mm

Shift the halves to backing strip fitment area.

Ensure the backing strip for proper cleanliness.

Backing strip size:- Material conform to IS:1079 Gr. `O’ or superior quality.

Width : 20mm, minimum

Thickness : 2.5mm, minimum

Fit the backing strip in the halve and ensure 10mm of backing strip inside the halve and

remaining 10mm projecting outside.

Ensure the backing strip for tight fittment and with no gap between halve and backing

strip.

Hold the backing stip by tack welding in 8 places of equi-distance.

Remove weld flux and spatters thoroughly.

Inspect the footring welding, backing strip fittment and welding for any defects and

record the details

The record shall carry date of inspection, cast number, length of weld, inspection details

etc.,

Bung Welding

Bung welding conform to IS:2062 or IS:1875, hot forged mild steel

Bung specification:- Outer diameter :52+0.0mm

-0.3

Coller diameter : 60+2mm

-0

Step height : 13+1mm

-0

Total height : 22+1mm

Collar taper :5 Thread : 3⁄4” x 14 TPI NGT

Thread angle :60 Use L1 and L9 thread gauges to ensure the conformity of thread.

Use C1 and C2 plain plug gauges to ensure the conformity of thread truncation.

Ensure identification mark of supplier at the bottom of bung .

Get clearance from BIS officer for further use.

Release the bungs to production.

Check for the stampings on bung and ensure cleanliness.

Place the flux are pre-heated at 150 degrees centigrade.

Start the machine and do the operation with 2 rounds of weld.

Bung welding parameters:- Amps : 240-270

Volts : 24-26

Speed : 13 sec/rev.

1. Remove the weld slag and inspect

2. Ensure the welds are smooth, uniform and defect free

3. Weld shall be free from blow hole, pin hole, under cut, under bead, burn out, lack of

fusion....etc.,

4. Burn-out and deep under cuts shall be rejected.

5. Remaining defects can be repaired by removing the defects fully by grinding and

re weld to the satisfaction.

6. Record the result.

7. The test record shall carry the date of inspection cast number. Colour code, accepted,

reworked, rejected and inspector details.

Assembly

1. Ensure both bung welded halve and footring welded halves are passed at its stages.

2. Check the inside of footring welded halve for proper cleaning and removal of weld

slag

3. Assemble bung welded halve over footring welded halve.

4. Ensure the joint is perfect and gapless.

5. Clean the joint by buffing process .

6. Ensure the joint is well cleaned and no dust, dirt, oil or corrosion etc.,

7. Shift to `C’ welding machine.

`C’ Welding

Ensure the assembled cylinders are undergone buffing operatin.

Ensure the weld flux are pre-heated at 150 C by oven

Ensure the condition of nozzle, ammeter, voltmeter and welding wire.

Load the cylinder and start the operation.

Set the welding parameters immediately and ensure the parameters are meeting to the

work instructions as declared.

Welding parameters:- Amps : 500 – 550

Volts : 28 – 30

Speed : 42 sec/rev.

 Do the welding operation continuously for 2 rounds.

 Any weld defect observed in first round of weld, stop the operation and remove

the cylinder.  Remove the defect by grinding and reweld other than burn-out.

 Continue the operation for second round.

 Check the cylinder for penetration by seeing though bung hole.

 Ensure the penetration is sound and satisfactory.

 Repair the weld defects if any other than burn-out, and reweld by machine and not

by manual arc welding.

 Enter the record for date of inspection, cast number, color code, accepted,

reworked.

-10- VP RING:- V.P tube conforms to IS:1239 (Part-1)

Tube diameter : 21mm

Thickness : 2mm

V.P ring diameter : 2203mm

Weep hole diameter : 2mm

Weight of the ring : 550 Gms(aprox)

Check for ISI monogram on VP tube, 1 cut of every meter distance.

There shall not be a ovality in the VP ring.

Check for VP ring joint weld for proper close in and weld defects.

Weep hole

A 2 mm diameter hole to be made opposite to the weld joint, to save the ring from

cracking at the of heat treatment.

STAY PLATE

IS:6240

Stay plate width : 52mm

Stay plate length : 122 +0mm

VP Shroud assembly:- Place one of each stay plate in the fixture by ensuring the marking towards upward.

Keep the VP ring (inspected one) over the stay plate end by ensuring the weep hole in

the bottom side.

Ensure the stay plates are seating in the center of VP ring.

Hold the VP ring tightly and ensure no gap between VP ring and stay plate.

Do tack welding and remove the assembly from fixture.

Chip-off the slag on tack weld and do for continuous welding both inner and outer.

Remove weld slag and inspect for weld defects, straightness and vertically.

FINAL WELDING (body welding)

 Ensure the final welding fixture is correct and no looseness is observed.

 Keep the inspected VP shroud over the cylinder and tighten the fixture.

 Ensure the shroud is sitting concentric. Check the equi-distance of stay plate from

the center of bung by using scale.

 Weld both inner and outer using a current of 130-150 Amps.

 Chip-off weld slag and spatters and check for overall height (620-630mm) with

the help of Go, No-Go fixture.

 Check all weld and body from bottom to top and allocate serial number to the

cylinder in the order with respect to different customers if every things are

perfect.

 Enter inspection record with respect to the inspection done.

 Maintain weld parameters record also.

Number punching:- Keep the 6mm number punches and material code letter punch in the order close to the

punching bed.

Keep the 3mm number punches and material code letter punch in the order to bung punch

area.

Keep the cylinder in the punching bed and punch the serial number of cylinder and

material code on stay plate, using 6mm punches as marked by chalk piece.

Turn the stay plate and punch batch number also as marked by chalk piece using 6mm

punches.

Punch serial number and material code on bung using 3mm punches as marked by chalk

piece.

Inspect the punchings for legibility and straightness both on stay plate and bung and

enter stage record.

For any wrong punching, delete the respective marking by way of grinding/filing and re- punch and re-inspect.

Heat treatment:-  Ensure all burners are burning uniformly.

 Ensure the temperature is thermocouple-1 and 2 are almost equal ( 5C is

permitted)

 Ensure the temperature inside the furnace is 680 to 710C

 Run the furnace at the temperature for atleast 20 minutes.

 Ensure the times is set for 81 seconds.

 Load the cylinders in sequence on both the rails and start the auto-functioning.

 Check the door raises for proper functioning.

 Keep the unloaded cylinders one over the other.

 Enter the stage record for date, batch number, cylinder serial number,

temperature, loading time and unloading time.

 Load the dummy cylinders one by one after the cylinders are over.

 Calibrate the furnace recorder, temperature indicator and thermocouple, once in

every six months.

H.S.T.

 Ensure sample selection (AT, BT selection) for the batch by BIS officer is over.

 Ensure hydrostatic batch stretch set and burst test on the cylinder selected is over

and passed the result.

 Plug the weep hole under the VP ring by using M-seal.

 Ensure the pressure gauges used on the stage are calibrated.

 Fill the cylinder with full of water one by one and load into the fixture for testing.

 Hold the fixture tightly and dry the external surface of cylinder fully by using

compressed air.

 Apply a pressure of 25.35kgf/cm2 by using hand pump.

 Tap the cylinder by using wooden hammer and wait for 30 seconds.

 Start inspection carefully from topto bottom and check for leakage.

 Reject the cylinder if it leaks at any point.

 Remove pressure and drain the water into the tank.

 Enter inspection record for date of inspection, batch number, serial number of

cylinders of the batch, serial number of cylinder tested, details of cylinders

rejected, number of cylinders reworked, name of inspector...etc.,

Shot Blasting

 Plug the cylinder bung thread by using threaded plastic cap.

 Switch on the machine and load the cylinders one by one.

 Ensure the shots getting on blasted in the cylinders moving into the chamber and

getting re-circulated properly.

 Remove cylinders one by one from unloading end.

 Check for the cleanliness all over the body and bottom portion of cylinder also.

 For any improper cleaning, adjust the timer setting of the machine with the help

of maintenance department personals.

 Do sampling test on one out of 50 cylinders and enter the record.

 Enter date of inspection, batch number, serial number of cylinders tested for

cleanliness, signature of the person inspected...etc.,

Metalising

 Use LPG and oxygen for melting the zinc wire.

 Use atleast 4kg pressure of air for taking the spray with force to the cylinder.

 Connect zinc wire, LPG, oxygen and airline to the metalising gun.

 Load the shot blasted cylinders one by one into the metalising chamber.

 Start the operation and make a uniform coating all over the body and bottom of

footring portion also to a thickness of 37 minimum.

 Check for the finishing.

 Check the coat thickness in one out of 50 cylinders with help of Elco meter, at

least in 2/3 places for ensuring uniformity.

 Enter inspection record for date of inspection batch number if cylinders tested for

coat thickness, signature of inspector’s .....Etc.,

PAINTING

a) Red-oxide painting:-  Plug the cylinder bung thread by using threaded plastic cap.

 Check the viscosity of red-oxide to 100-120 sec with the help of paint flow cup.

 Keep the cylinder horizontally on the roller bed near the painting system and

apply a coat of red-oxide to the bottom portion of cylinder.

 Ensure the red-oxide covered uniformly all over the bottom surface of cylinder.

 Keep the cylinder vertically on the painting bed and rotate the cylinder. Apply

red-oxide on all over the body and VP ring bottom and top portion of the cylinder.

 Ensure on uniform coverage all over the body.

 Unload the cylinder from the bed and move to the designated place for drying

 Wait for 2 hours or till the cylinder gets complete dry.

 Ensure the cylinder dried fully.

 Check coat thickness to a minimum of  on allover the body with the help of

Elco meter on cylinders selected randomly.

 Remove the plastic cap plugged for the bung thread.

b) Signal red painting

 Plug the bung thread and top surface of bung by using special plastic cap.

 Check the viscosity of signal red paint to 100-120 sec with the help of paint flow

cup.

 Keep the operation repeats as of red-oxide painting till the cylinder unloaded from

the painting bed.

 Wait for 6-8 Hrs. or till the cylinder gets complete dry.

 Ensure the cylinder dried fully.

 Remove plastic cap and ensure the top of bung surface not coated with signal red

paint.

 Check the coat thickness to a minimum of 67 on all over body by using

Electometer on cylinders selected randomly.

 Enter inspection record for date inspection, batch number, serial number of

cylinder tested for paint coat thickness, average coat thickness observed, remarks

and signature of inspection personnel and department HOD.

INTERNAL CLEANING

 Remove the water from inside cylinder with help of compressed air, using cotton

and dry the inner surface by blowing air inside.

 Hit the cylinder by using wooden hammer at 2 or 3 place.

 Remove foreign particles if any with the help of magnet and M-seal.

 Ensure thorough cleanliness inside by using low voltage lamp.

 Ensure the serial number of cylinder punched on stay plate and bung are

matching.

 Enter inspection record for date of inspection, batch number, serial number of

cylinder tested for internal cleaning, remarks, signature of inspectors....etc.,

Tare weight

 Calibrate the weighing machine by using standard weights and ensure no error.

 Keep a LPG valve permanently on the weighing machine platform to add the

value weight also with the weight of cylinder.

 Keep internally cleaned and inspected cylinders on the weighing machine

platform and note down the weight with respect to cylinder serial number,

 Follow the rounding off procedure for odd and even number weight.

 Write the rounded off weights by single digit by using chalk piece.

 Place the cylinder on the punching bed and mark the weight against TARE

WEIGHT in the stay plate by using 6mm number plate.

 Add the tare weight with 14.2 kg and mark the total weight against GROSS

WEIGHT marking.

 Turn the cylinder and punch TEST DATE also.

 Shift the cylinder to bung punch and mark the TARE WEIGHT on bung by using

3 mm number punches.

 Enter the inspection record for date of inspection, batch number serial number of

cylinder tested, actual weight observed, rounded-off weight, remarks, inspector’s

signature...etc.,

 (all stay plate markings are 6mm size and bung marking are 3mm size)

Bung Thread Cleaning

 Take 3⁄4” NGTT tap and fix it on a handle for easy operation.

(NGTT: National Gas Taper Thread)

 Clean the bung thread by using the tap and check with L1 and L9 thread plug

gauges for bung thread conformity.

 (wrongly tapered thread (or) uncleanness bung threads may damages the valve)

 Pass the cylinder to next stage if it conform to the thread requirements otherwise

retap it properly, recheck and pass.

 Enter inspection record for date of inspection, batch number, serial number of

cylinder tested, position of L1 and L9 gauges, remarks and inspectors

signature...etc.,

VALVE FIXING

 Take the valves supplied by the customer and wound the threaded portion by

using Teflon thread sealant tape at least by 3 rounds.

 Screw the valve to the bung thread by hand tight.

 Ensure the valve fixing machine is set in the range of 140-150 lbs/ft.

 Place the cylinder in the valve fixing machine and switch on.

 See that the valve is tightened with bung thread and no valve thread damages

observed.

 Remove the cylinder and repeats the other cylinder one by one.

 Check the valve torque randomly by using hand “torque wrench”

 Check the valve torque is lying in the range of 14515lbs/ft

 Check the cylinders randomly and enter the record for date of inspection, batch

number, serial number of cylinders tested, torque observed, remarks and

inspectors signature.... Etc.,

FINAL PNEUMATIC TESTING (FPT-I)

 Fill the cylinder with 10 kgf/cm  of air pressure minimum by using special air

filling gun.

 Hit the cylinder at 2 or 3 place by using wooden hammer and check air pressure

inside by using pressure gauge.

 Ensure the air pressure inside is 10 kgf/cm2

, minimum and pass it to next stage.

 Load the cylinders in the FPT tank and wait for the water movement comes to

stand still.

 Ensure the water in the tank is clean enough to detect minor leakages/bubbles.

 After the water movement is stopped, wait for 1 minute to make the bubbles

generates through the leakages if any.

 Reject the cylinder, if it leaks at any place other that valve joint.

 Mark the cylinder as VJL (Valve Joint Leak), evacuate air inside the cylinder,

keep the cylinder on manual valve fixing bed, remove valve by using handle,

clean the bung thread by using 3⁄4” NGTT tap, check with L1 and L9 thread plug

gauges for bung thread conformity, fit with other valve wounded by Teflon tap,

fix the valve using automatic valve fixing machine, refill air and recheck

 Make a hole on the body of rejected cylinder and pass it to the rejection yard or

designated place.

 Shift the passing cylinders to the next stage.

 Enter inspection record for date of inspection, remarks, name of inspector... etc.,

Soap Leak Testing

 Take soap solution and mix it with water to the ratio required.

 Ensure the soap water mixing is sufficient enough to detect lakage.

 Keep the cylinder on the soap leak testing stand and rotate pour the soap water on

all over the body land weld.

 Ensure the soap water is not getting sprinkled on the ground/floor and see that it is

recycled.

 Wait for 10 seconds and start inspection.

 Leakage at any place other than valve joint is rejected.

 Follow the procedure as declared in previous stage, for valve joint leak cylinders.

 Enter inspection record for date of inspection, batch number, serial number of

cylinder tested, passed, rejected, reworked, remarks and name of inspector...etc.,

FINAL QUALITY CHECK LIST (FQCL)

 Ensure the air from the cylinder is removed fully.

 Check for proper fitment of safety cap.

 Check for serial number on stay plate and bung and ensure both are matching.

 Check tare weight punching on stay plate and bung and ensure both are matching.

 Ensure the grass weight marking is right.

 Check for tare weight stenciling on body and inner stay plate and ensure for

matching with respect to stay plate marking.

 Check for batch number and test date markings and ensure both markings are

right

 Check for footring for customer identification at two places and license number

and type of ventilation hole and its sizes.

 Check for painting all over body, top portion of cylinder and inner stay

plate...etc.,

 Check for other stencils like check seal, switch off regulator and due for test.. etc.,

 Enter date of inspection, inspectors name, details of rejections....etc.,

 Get the approval of in charge-QA and file.