



NATIONAL PETROCHEMICAL COMPANY
STANDARDS

CONSTRUCTION STANDARD
FOR
SHOP INSPECTION OF ROTATING EQUIPMENT

NPCS-CS-TP-03

REVISION : 0

JULY 1992



CONTENTS

1	<u>SCOPE</u>
2	<u>GENERAL</u>
3	<u>PUMPS</u>
4	<u>COMPRESSORS</u>
5	<u>TURBINES</u>
6	<u>ENGINES</u>
7	<u>FANS</u>
8	<u>GEAR UNITS</u>
9	<u>AGITATORS AND MIXERS</u>
10	<u>AUXILIARY SYSTEMS FOR MACHINERY AND ROTATING EQUIPMENTS</u>

THIS DOCUMENT IS THE PROPERTY OF N.P.C. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR BY ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF N.P.C.



1 SCOPE

1.1 This standard covers the minimum requirements for shop inspection of rotating equipments to be supplied to NPC for major contract.

1.2 The procedure outlined in this standard are complementary to any requirements that may also be laid down in individual NPC Standard referred to here in.

1.3 Waiver of any requirements specified here in requires the written approval of NPC.

1.4 NPC construction standard for shop inspection (NPCS-CS-TP-01) shall be used for general terms and procedure of inspection.

1.5 Reference is made by all relevant standard, which is indicated in purchase order requisition and NPC Standard and the following standards:

- API 610 Centrifugal Pumps for General Refinery Service.
- API 611 General-Purpose Steam Tubing for Refinery Service.
- API 612 Special-Purpose Steam Turbine for Refinery Service.
- API 613 Special-Purpose Gear Units for Refinery Service.
- API 614 Lubrication, Shaft Sealing and Control-Oil Systems for Special Purpose Application.
- API 616 Type H Industrial Combustion Gas Turbine for Refinery Services.
- API 617 Centrifugal Comp. for General Refinery Services.
- API 618 Reciprocating Compressor for General Refinery Services.
- API 619 Rotary-Type Positive Displacement Compressor for General Refinery Services.

THIS DOCUMENT IS THE PROPERTY OF NPC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED, TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPC.



- API 671 Special-Purpose Couplings for Refinery Services.
- API 672 Packaged Integrally Geared Centrifugal Air-Compressor for General Refinery Services.
- API 673 Special Purpose Centrifugal Fans for General Refinery Services.
- API 674 Positive-Displacement Pump-Reciprocating.
- API 675 Positive Displacement Pump-Controlled Volume.
- API 676 'Positive Displacement Pump-Rotary.
- API 677 General Purpose Gear Units for Refinery Services.
- API 680 Packaged Reciprocating Plant and Instrument Air-Compressor for General Refinery Services.

2

GENERAL

2.1

Verification is required that the vendor has or is establishing liaison with the manufacturers of the driven machinery, gear box and driven machinery to ensure compatibility of components. This is particular so where the items are shipped separately to site and with regard to lateral and torsional critical speed analysis of the complete units.

2.2

Verify that alloy materials, when specified to be in conformance with ASTM, ASME, ANSI or other standards meet all of the requirements of the indicated standard plus any supplementary requirements outlined in the purchase order, specifications or data sheets. This means that the material must not only meet the chemical and physical properties, but must also meet all processing and testing requirements of the indicated standard.

2.3

Rotation checks shall be made on all rotating machinery against specifications and drawings.



3 PUMPS

3.1 GENERAL

3.1.1 This procedure is intended to apply to pumps covered by API standards, and all related NPC Standards.

3.1.2 A pre-inspection meeting shall be held in accordance with NPCS-CS-TP-01.

3.2 INSPECTION

3.2.1 Inspection operations may be performed either during periodic visits, when pump is in the manufacturing/assembly stage! or after assembly (preferably before testing). In addition to the required inspection and status reports, document all inspection using a copy of the purchaser approved manufacturer's drawing (s) .

3.2.2 Inspection of pumps shall be in accordance with API, unless otherwise specified in purchase order.

Inspection engineer shall check the followings

3.2.2.1 Materials against pump data sheet (including certification).

3.2.2.2 Intermediate inspection (s) during fabrication to check on workmanship, e.g. quality of casings, examination of machined parts, assembly, welding, etc.

3.2.2.3 Minimum wall thickness of casing.

3.2.2.4 Repairs

Major casting defects shall be brought to the attention of inspection engineer. Major repairs will be witnessed after chipping out, prior to welding and after completion of welding. Repair procedures for welding and heat treatment shall be sent to NPC for approval.

3.2.2.5 Heat treatment (also for major repairs).

THIS DOCUMENT IS THE PROPERTY OF NPC. IT IS CONFIDENTIAL AND ALL RIGHTS RESERVED. TO THE OWNER NEITHER THE WHOLE NOR ANY PART OF THIS DOCUMENT MAY BE DISCLOSED TO ANY THIRD PARTY, REPRODUCED, STORED IN ANY RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM OR ANY MEANS WITHOUT THE PRIOR WRITTEN CONSENT OF NPC.



3.2.2.F Witness hydrotest of casing (if specified) including welded-on piping , such as vents and drains. Check testing medium (e.g . specified wetting agent, use of petroleum) , stamp hydrotested casings.

Note that for barrel pumps, suction and/or discharge heads shall be separately hydrotest.

3.2.2.7 Nondestructive Testing

3.2.2.8 Check balancing of rotor/impeller and runouts (mechanical and electrical).

3.2.2.9 Witness running/performance test(if specified); the duration of the running test shall be sufficient to assess the final temperature rise of bearings, etc. performance test; check :

- a) Test equipment calibration.
- b) Head/capacity/power readings (at agreed points of curve).
- c) Bearing temperatures.
- d) Performance of auxiliary system (lube oil, cooling, speed control devices! etc.). Testing may be done as a separate unit (section 10 and API).
- e) Vibrations (if specified).
- f) Seal leakage.
- g) Rotation direction.

3.2.2.10 Witness NPSH test (if specified). Requirements as per pump data sheets.

3.2.2.11 Spare rotors will be subject to running and performance test, if specified.

3.2.2.12 Dismantling inspection (stripping check), after running/performance test, if specified.

Check visual for :

- a) Workmanship; surface condition of body, cover and internal (impeller, screw, etc.).
- b) Wear rings, throttle bushings, etc. Check clearance and hardness to seller's tabulation sheet.