



NATIONAL PETROCHEMICAL COMPANY
STANDARDS

CONSTRUCTION STANDARD
FOR
SHOP INSPECTION

NPCS-CS-TP-01

REVISION : 0

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1 SCOPE

- 1.1 This standard covers the minimum requirements for shop inspection of materials and equipment to be supplied to NPC for major contracts.
- 1.2 The procedures outlined in this standard are complementary to any requirements, that may also be laid down in individual NPC standards referred to herein.
- 1.3 Waiver of any requirements specified herein requires the written approval of NPC.

2 GENERAL

2.1 DEFINITION OF TERMS

- 2.1.1 Client means National Petrochemical Company, (NPC).
- 2.1.2 Contractor means the company, who has been accepted by the client to carry out the said contract and ensure responsibility for its execution.
- 2.1.3 Sub-Contractor means a company awarded part of the works by the contractor under a separate, but acceptable contract to the client and not concerned with site construction.
- 2.1.4 Representative is the client's representative, who is usually defined in each contract as the project manager and/or engineering manager.
- 2.1.5 Inspector is the shop representative of the designated inspecting authority, and is responsible for passing and receiving all information to that authority.
- 2.1.6 Inspection company means a company sub-contracted by contractor or client to carry out independent inspection on it's behalf.



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- 2.1.7 Vendor means the firm or company with which the purchase order is placed, and which is to furnish the Goods to the client under the purchase order.
- 2.1.8 Standards, codes publications and abbreviations as referred to in this procedure are referenced NPC standard for each item under discussion.
- 2.1.9 Witness testing indicates that vendors tests shall be witnessed by contractor, client, or contractor's or client's legally authorized representative.
- 2.2 RESPONSIBILITIES
- 2.2.1 Contractor shall be required to provide inspection services as part of contract, unless otherwise specified and shall submit with his proposal his inspection procedures including if and for what purposes he intends to sub-contract to an inspection company, inspection of **materials** supplies and equipment. He intends to use for the contract which should conform with the requirements of his document and NPC specifications as a minimum. Additional requirements which may be standard for either contractor or inspection company may also be included.
- 2.2.2 Sub-Supplier shall be subject to the same requirements for inspection as a vendor.'
- 2.2.3 The contractor may hire the same inspection company as the client provided, inspection does not cover identical materials from the same' country.
- 2.2.4 When contractor hires an independent inspection. company for all or some of its inspection work, it is the responsibility of the contractor to organize and establish a procedure ensuring the proper flow of documents **between** inspecting company, contractor and client for each area of operation in the world. This procedure is to be formalized at a meeting between all parties concerned. A flow chart should preferably be prepared showing the arrangements made if complicated.



- 2.2.5 Testing etc., requiring simultaneous inspection by the client, contractor and/or inspection company, such as in the case of the following types of final inspection shall conform with Para. 2.2.6 and 2.2.11. witness tests, control panels defects, dismantling of rotating equipment, switchgear, etc.
- 2.2.6 In the above cases for the relevant pre-inspection meeting contractor shall give 10 days minimum prior notice to the inspection company and the client (see 2.2.11 also).
- 2.2.7 The contractor or an inspection company shall not waive any inspection or test called for under this inspection procedure or as otherwise agreed without notifying the representative with approval in writing.
The degree and frequency of inspection is dependent upon the complexity and criticality of the materials and equipment in question. Inspection activities also included the survey and evaluation of prospective vendors to determine their capabilities and current shop Load.
- 2.2.8 The contractors shall expedite delivery in such a manner, as to allow sufficient time for inspection to achieve completion on time and shall supplement his established practice, when considered necessary by the contractor's manager responsible for carrying out the whole project.
Client shall have the right to inspect at its expense all materials supplies and equipment at the vendors shops provided. However, that in exercising its right client shall not cause undue delay or inconvenience to contractor in the execution of contractor's work. The contractor, at its expense shall provide client's appointed representatives with the documents set out below in 2.2.9 in sufficient time to enable the client's appointed representative to reveiw documents and carry out inspection generally in accordance with the practice of independent inspection procedures, as laid out in 3.3.3, 3.3.4 and 3.3.5.
- 2.2.9 Purchaser orders and suborders for equipment subject to inspection by an inspection company or by client or his appointed representative shall include the provisions of clause 2.2.8 or the contract and shall provide for issue to the inspecting authority of two copies of orders and suborders and of working drawings and fabricating and testing procedures.,

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- 2.2.10 During the course of manufacture, fabrication and construction of any materials for the project, contractor shall at its expense make or cause to be made; all tests required by the contract documents and approved specifications. In the event that any question arises as to the acceptability of any materials, equipment or workmanship upon which the safety or mechanical integrity of the project or of any part thereof depends, client may require additional tests. If it is determined by such tests that the item tested is free from defects. Client shall pay the cost of such tests and the contractor shall not be penalized for loss of time occasioned thereby. If such tests reveal defects, requiring correction, contractor shall pay the cost of such tests and subsequent retesting by either contractor or client and shall at its own cost and expense, immediately remedy the defects.
- 2.2.11 In all cases the contractor shall give to the client's appointed representative five days notice of any test to be made by vendor and/or contractor in order that clients appointed representative may witness any such tests.
- 2.2.1.2 Inspection by or on behalf of client shall not release contractor or any of its vendors or sub-contractors of the responsibility and liability as provided for in the **contract**.
- 2.2.13 It is not always possible in some areas to define the precise extent and scope of inspection during preliminary design, and in these cases the bidder (contractor) shall clarify the areas at the stage of bid presentation.
- 2.3 GENERAL PROCEDURES
- 2.3.1 Contractor shall indicate on all purchase orders and suborders, that equipment and installation are subject to inspection and approval by client and that any equipment or installations not conforming to approved specifications may be rejected. Vendor shall not be normally be advising of any waiving of inspection prior to readiness for inspection at any stage.



2.3.2

Summary of Degree of Inspection for Code Compliance

For boilers, heat exchangers, pressure vessels, heaters and power piping inspection for code compliance includes:

- Appraisal of fabricators working, drawings to code and order specifications.
- Appraisal of weld procedures, witnessing tests performed, also verification of welder qualifications.
- Verification of pressure containing materials against works, test sheets. Source inspection at material suppliers as agreed. This is normally confined to materials for special duties, i.e. thick walled reactor vessels, low temperature impact tests, plates to be ultrasonically examined etc. source inspection to tubes for heaters, boilers and exchangers.
- Inspection during all stages of fabrication, examination or radiographs and witnessing other NDT specified.
- Verification of heat treatment.
- Dimensional check for code and drawing compliance.
- Witness final pressure tests followed by final examination and stamping.
- Inspector is responsible for checking all components of an order in their entirety to ensure the complete goods are dispatched, according to purchase order requirements.
- Vendor preservation procedures and packaging.
- Countersigning manufacturers code forms and issuing final certificate.

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2.3.3 Additional Inspection of Coded Equipment for order Compliance

In addition to above, the purchase order may contain other items or requirements not governed by code such as tower trays and vessel internals, heater and boiler structural steelwork and ancillary equipment, special prepatation and application of coatings, non coded pipework. This is included, unless, otherwise stated to ensure complete equipment ordered is subject to inspection for order compliance.

In the case of highly specialized equipment such as reactors, special inspection procedures shall be drawn up and agreed upon by all parties concered and shall form past of the purchase order.

2.3.4 Inspection of other Plant Equipment Items

The scope of survey of plant equipment associated with the petrochemical industry as noted includes boiler, heat exchangers and pressure vessels. Also in addition the degree of inspection covering machinery items, pipework, tankage, electrical equipment, etc., is indicated and shall include those items listed under 2.3.2 as pertinent.

2.3.5 Extent of Inspection

2.3.5.1 Any relaxation of inspection to the percentage of inspection as indicated, will apply only to proven of NPC.

2.3.5.2 The inspection percentage is related to the quantity(Number off) of items of equipment concerned and is not intended to indicate the degree of inspection to be carried out on the equipment.

2.3.5.3 Where 100% inspection is called for against a particular series, it means that all equipment in series would be inspected. For example, where a number of vessels are on order with one or more vendors, each vessel would be subject to inspection.

2.3.5.4 Where 10% or other specified percentage of inspection is called for, as in the case of small motors, if means that the percentage of the quantity order on each vendor would be inspected.



2.3.5.5

Percentage to be Applied:

- Pressure Vessels : 100% inspection (all types)
- storage tanks : 100% inspection of plate for API tankage and spheres.
- Heat exchangers : 100% inspection (all types)
- Fired process : 100% inspection of heaters material for all types
100% inspection of steel stack
10% inspection of Ducting
- Steam Generators : 100% inspection of and boilers materials for all types
100% inspection of steel' stack
10% inspection of Ducting
- Package Units : Such as refrigeration system., nitrogen plant ,filters, product finishing and package equipment, boiler feedwater treating units, instrument airdriers, mixers and agitators, cooling tower components and other specialized equipment not listed elsewhere, 100% inspection.

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- Valves : 100% inspection of cast and forged carbon steel for cold service, and all valves series 900 and above.

100% inspection of alloy steel valves.

Rest of valves, random.
- Pumps and Drivers : 100% inspection and witnessing of tests specified under minimum standard inspection requirement.

100% inspection and witnessing of running test on steam turbines of 250 h.p. and larger.
- compressors and Drivers : 100% inspection of all type of compressors and gearing. Extent of inspection of drivers to be the same as for pump drivers.

2.3.6 Distribution of Orders (Coded Equipment)

Two copies of equipment purchase orders, together with specifications, requirements and data should be forwarded to the inspector at the time of issue. The purchase order must include an inspection clause.

- 2.3.6.1 Notifying the vendor that the equipment is subject to inspection and certification by an inspector (company name)/client representative.
- 2.3.6.2 Copies of sub-orders of inspectable materials should be forwarded to the inspector at the time of issue and contain a similar inspection clause.
- 2.3.6.3 Copies of vendors working drawings are to be submitted to the inspector for appraisal.



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- 2.3.6.4 Equipment is not to be shipped until an inspection release note, has been received from the inspection company for the contractor, or the representative in case of contractor's own inspection.
- 2.3.6.5 Copies of supporting data covering fabrication and testing are to be provided to the inspector.
- 2.3.7 Distribution of orders(Non-coded equipment)
- Same as above except; working drawings are not required for appraisal, but where applicable, copies to be made available for inspection purposes.
- 2.4 COST OF INSPECTION
- 2.4.1 Contractor shall be totally responsible for undertaking all charges incurred in inspection(with the exception as specified in para. 2.2.10), wether by his own organization or by utilizing sub-contractor to accepted inspection companies, necessary for the proper execution and completion of all inspection requirments of the contract.
- 2.4.2 Any additional inspection that the client wishes to make will be indicated in the purchase order.



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- 3 INSPECTION AND QUALITY CONTROL PROCEDURES
- 3.1 SCOPE
- 3.1.1 These procedures and instructions apply to inspection of purchased equipment, components and/or materials at source; i.e., at the manufacturer's plant during the manufacturing process, including raw materials and other items sub-ordered by equipment/component manufacturers.
- 3.1.2 In general, shop(or source) inspection shall be performed on an audit type basis extent of inspection specified during the manufacturing process, supplemented with visual and dimensional inspection of the finished product, including inspection of shipping preparations.
- 3.1.3 Resident inspection shall be provided when specifically required by contractual obligations, purchase order requirements or when requested. It may also be implemented when a sufficient workload is in any one shop to warrant resident inspection, or, if deemed necessary, in order to obtain the required quality of product(s) as defined by the purchase order and accompanying documents.
- 3.1.4 *This* standard must be used in conjunction with contractual documents, which identify the scope of work of the project in hand and is not intended to be used alone.
In cases of any conflict between requirements of this standard and other contractual documentation, the conflict shall either be resolved at the design stage or *the* predominating document as indicated in the contract followed.
- 3.1.5 Modifications to the extent of inspection and/or witnessed test may be proposed by contractor, considering following factors:
- Referenced suppliers for standard materials.
 - Materials to be used in non-critical services.
- Such modifications shall be submitted by contractor clearly, referring to the individual inspection procedure and material for which modification will be applicable.
Modification shall not valid without NPC written approval.



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3.2 AUTHORIZATION

- 3.2.1 Inspection is authorized by the designated authority, who will implement as requested in the purchase order and so noted in the inspection clause of the purchase order.
- 3.2.2 All purchase orders shall contain relevant NPC general standard specifications and individual job specifications plus inspection requirements.
- 3.2.3 The inspection guidelines set forth in this standard shall not be construed, as over-riding inspection requirements indicated in individual purchase orders or their attachments.

3.3 CODES AND STANDARDS

- 3.3.1 The inspector will be guided by the requirements of the code(s) and standards-stipulated in the purchase order.
- 3.3.2 Many ASME and ASTM standards pertaining to material specifications provide "Supplementary Requirements", which apply only when specifically ordered by the purchaser. These requirements are not part of an order, unless called for in specifications, drawings or the purchase order.
- 3.3.3 All queries regarding referenced codes and standards shall be presented to the contractor and NPC designated authority for decision.

3.4 PRE-INSPECTION MEETING

- 3.4.1 The inspector is responsible for thoroughly reviewing each assignment and immediately resolving or reporting any apparent conflicts or ambiguities to the proper authority.
- 3.4.2 When it is required that a pre-inspection meeting shall be held with the supplier, it shall be scheduled by the inspector, as soon as practical. The date(s) for this meeting shall be established in order to give all interested parties the opportunity to attend. This is especially important, when large and sophisticated equipment, such as compressors, pumps, high pressure/high temperature pressure vessels and heat exchangers are involved.