Dear partners!

If you have any technical questions regarding the specification, please contact:
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Abbreviations:

GT – green tire - tire assembled on Tire Building machine and not vulcanized on curing press yet.

1. Scope of works

The purpose of this specification - provide to the supplier basic information for carrying out work on the manufacture of building drum for customer's Tire Building machine.

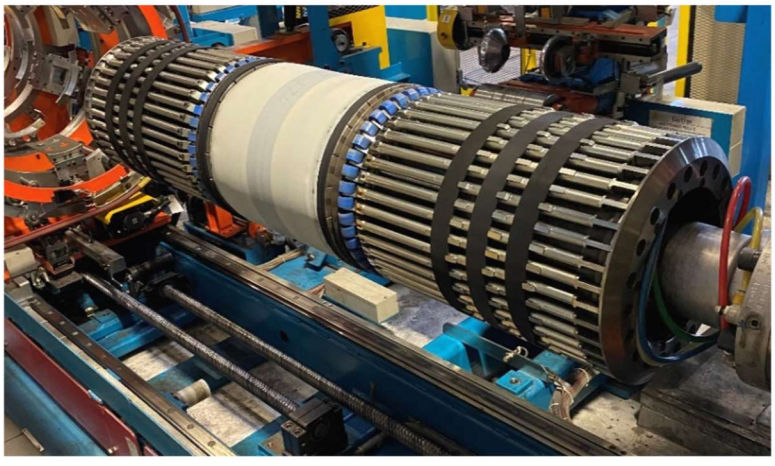
The supplier must develop a set of drawings based on the customer's drum design (if necessary), manufacture and deliver to customer's site **15 inch shaping drum – 1 pc.**

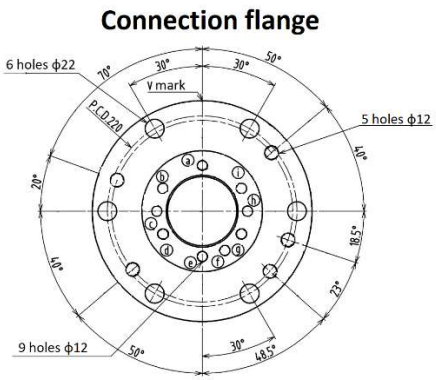
Received drum may not have same design, but should cover basic requirements: external/connection dimensions, movements, materials, marks, etc. Detailed it explained on chapter 2 "Equipment acceptance".

In case of drum will have differences with original one, Supplier should provide maintenance manuals with sufficient information to perform drum maintenance and arrange on-site training for Customer's operators.

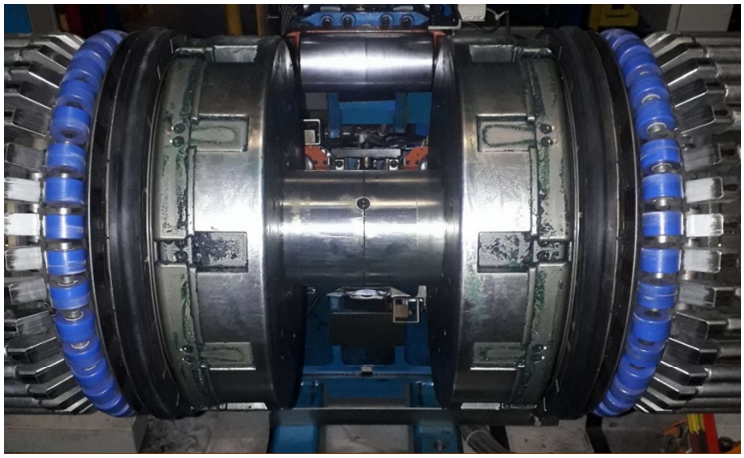
Main drum's properties:

- finger-type mechanical drum with central rubber bladder. Using for connection BT part (thread-belt-spiral layer) and Band part (inner liner-ply-sidewalls) and stitching by rollers after central bladder expose.
- Drum movements:
  - Central bladder inflate (air) / deflate (exhaust or vacuum)
  - Central segments expand (air) / collapse (air)
  - Turn-up fingers expand (air) / collapse (air)
  - Beadlocks expand (air) / collapse (vacuum)



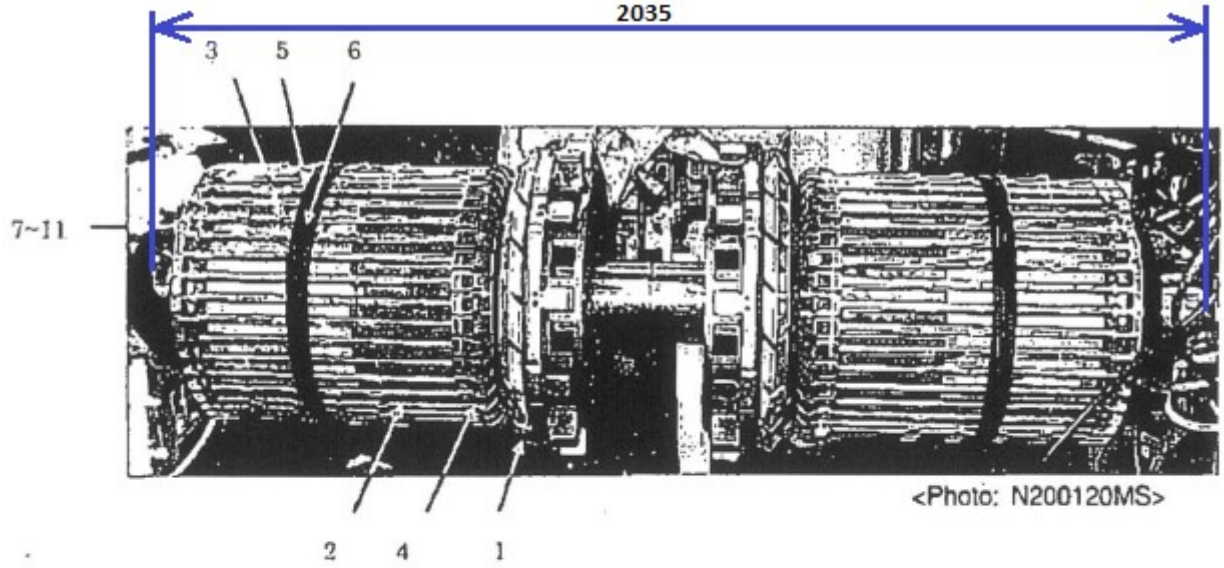


Picture 1 – photo of shaping drum



Picture 2 – photo of shaping drum without bladder

Main parts of shaping drum:



No.	Name	Function
1	Bead lock segments	Hold green tire bead area
2	Turn-up fingers / arms	Turn-up materials
3	Turn-up finger cylinders	Open and close fingers
4	Turn-up rollers	Touch and turn-up materials
5	Gum band position hooks	Keep gum bands in place when fingers are opening or closing
6	Gum bands	Keep fingers together (prevent them coming apart)
7	Finger fulcrums	Connection between fingers and drum unit
8	Fulcrum guide rings	Maintain fingers in position around circumference
9	Fulcrum holders	Keep fingers in position and prevent them from slipping out along axis
10	Fulcrum holder fixing ring	Support finger fulcrums.
11	Finger stopper ring	Stop fingers from opening while drum is rotating

Due to absent of drum's drawings, supplier must visit Customer's site and check drum's design and building process.

If necessary, Customer can send existing shaping drum to Supplier for drum design preparation.

The supplier's quotation must contain the following:

1) Cost of design development (in case of necessity)

2) Cost of equipment manufacturing according to current specification, including the cost of delivery to customer

3) Calculation of project time.

The supplier must provide a detailed work schedule indicating all stages of the project and the technological process for manufacturing the drums and approve it with customer. It is necessary to inform customer on progress periodically in the form of a short report by email about the work done during the week and the % of work completed to date.

Drum should be manufactured not later than October, 2025.

4) Warranty obligations for equipment and work performed.

5) Acceptance procedure at the customer's site.

6) Cost of business trip for Supplier's representative to participate in acceptance works and perform operator's trainings (if necessary).

If necessary, the quotation should include drawings, schemes, specifications and other necessary information.

The supplier must include specification number in the contract and indicate that the contract complies with the requirements of this specification. If there are discrepancies with the customer's specification, the supplier must explain it clearly.

2. Equipment acceptance

After drums delivery it will be checked according Appendix 1, including:

1) Before equipment delivery to customer, the supplier must approve by customer the following documentation:

- a set of approved drum drawings (if exist);
- list of spare parts.

2) By request – supplier's site visit by representative of customer to check appearance, dimensions, quantity, operability of the drums, compliance with the requirements of the drawings and this specification.

Anyway, after drum manufacturing and before delivery should be filled "Manufacturing" column on Appendix 1.

3) Final acceptance of work will be at the customer's site and consists of the following stages:

3.1) drum inspection in accordance with check-list on Appendix 1, "Acceptance" column (Dry-test).

3.2) drum installation to Tire Assembly Machine and perform trial building process according table below (wet-test):

Quantity of tires	**Explanation of trial**	**Expected time**
3 lots x 3 GT	Build 3 lots of 3 GT without vulcanization on a new drum with measurements after each lot. Measurements are carried out according to the TireBuilding machine qualification program.	7 days
20 tires on Customer's drum and 20 tires on new drum	Build 20 GT on the original drum of the Customer, and then 20 GT are build on a new drum without any changes in the assembly machine. After that, comparative acceptance tests are carried out (uniformity, appearance deviations, cross-sectional analysis of the tire sample, overall dimensions, tire load/speed capacity, etc.).	14 days
1 shift x ~200 tires	Build at least 200 GT per 1 working shift, then they are vulcanized on a curing press. After that, an analysis of uniformity and appearance deviations is carried out.	7 days
~1000 tires	Build at least 1000 GT, then they are vulcanized on a curing press. This stage includes at least 1 changeover. After that, an analysis of uniformity and appearance deviations is carried out.	14 days

In case of a negative result at any stage, the Customer's representatives evaluate the impact of the new drum on the performance indicators and, if any deviation of the drum performance indicators from the specification requirements is detected, the Supplier must eliminate all comments.

Potential impact of the drum on the assembly results:
- Traces on the "green tire" from drum parts;
- Mechanical damage to the GT from drum parts;
- Jamming/sticking of moving drum parts;
- Incorrect installation of the central diaphragm or beadlock rubber rings;
- Incorrect installation of rubber rings on turn-up fingers;
- Insufficient or excessive force of the tightening pins;
- Asynchronous (asymmetrical) movement of parts of the right and left sides.

3.3) removing the drum from the TireBuilding machine, disassembling it on the stand and checking the wear and tear on the parts in accordance with the checklist in Appendix 1, section “After use”, column “Acceptance”.

The tools used during acceptance (theodolite, indicator with a magnetic stand) are provided by customer.

All comments identified during acceptance of work must be eliminated by the contractor within the approved by Customer time. Equipment acceptance will be only after all comments have been eliminated.

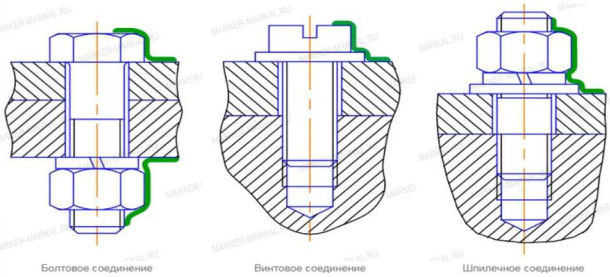
If there are no comments or after they have been eliminated, an acceptance document is signing.
The transportation of drums to eliminate defects identified during acceptance is carried out by the contractor.

3. Warranties

1) The warranty period is 1 year from the date of signing the acceptance protocol. If the customer finds defects that result in deviations from the characteristics specified in the specification, the Supplier must eliminate them within the period agreed with the Customer free of charge.
2) Supplier is responsible in the malfunction caused by equipment/parts purchased by the supplier from a third party.

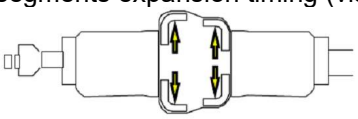
4. General manufacturing requirements

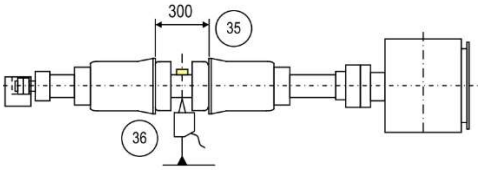
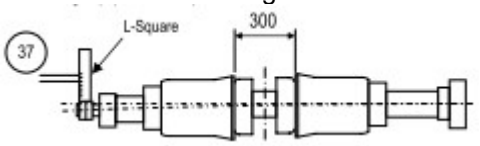
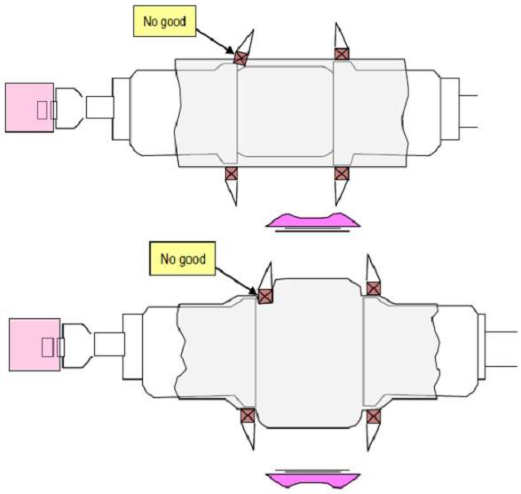
1) A customer’s representative must be able to check the progress of equipment manufacturing at the supplier’s site at any stage.
2) The manufacturing of drums should start only after approval set of drawings by customer.
3) The purchasing of commercial parts with a long delivery time (such as ball screws) should also begin after agreement with customer.
4) If necessary, the following must be done: beveling of edges, deburring, grinding.
5) The spare parts kit is not included scope of work. A list of spare parts should be provided.
6) Drum should have marking including inch and drum number
7) In case of difference in dimensions between existing drum and dimensions in Appendix 1 checklist, final dimension should be approved with Customer.
8) After tightening the fasteners, markings must be made in accordance with Fig.1.



9) It should be provided measures to prevent loosening of bolted connections (lock washers, thread sealant, nylon insert nuts, etc.).
10) If a coating is indicated on the drawing of a part/assembly/product, the supplier should not independently decide to replace or not provide the coating.
11) Replacing a galvanic or chemical coating with a paint and varnish coating containing coating elements (for example, “cold zinc”) is not allowed.
12) The preferable type of paint coating is powder, unless otherwise specified in the drawing.
13) The supplier shall notify the customer about any deviations from this specification and the accompanying documents. Before starting work, written confirmation of such deviations must be received from customer.
14) Specification might be partially changes and approval by both sides after ordering.
15) If any mistakes are discovered in customer’s drawings or specifications, the supplier must contact with customer to approve changes. The supplier must not deviate from specification without confirmation with customer.

Appendix 1. Shaping drum acceptance checklist

Step	Criteria	Plan	Manufacturing *	Acceptance **
Before use	Documentation (drawings, manuals, spare parts list) enough for use	OK		OK / NG
	There are no materials that can be a source of contamination in GT	No contaminations		OK / NG
	Overall dimensions same as existing drum: • Drum length • Shaft diameter • Thread size for air hoses • Air hoses quantity and color	 2035±2 mm Ø105±0,3 mm same as existing drum same as existing drum	 OK / NG OK / NG	 OK / NG OK / NG
	Connection flange dimensions	same as existing drum	OK / NG	OK / NG
	Fingers design: • Fingers quantity • Finger design (length, rollers, material) • Stroke • Places for rubber band installation	 40 + 40 pcs same as existing drum 180,5±0,5 mm same as existing drum	 OK / NG OK / NG	 OK / NG OK / NG
	Beadlocks design: • Beadlocks shape, proper bead installation • Collapse diameter • Expand diameter • Min width • Max width	 Same as existing drum Ø338±0,5 mm Ø398±0,8 mm <180 mm >500 mm	 OK / NG	 OK / NG
	Segments design: • Overall dimensions • Collapse diameter • Expand diameter	 Same as existing drum Min Ø335 Max Ø432	 OK / NG	 OK / NG
	Proper rubber gums and bladder installation	Same as existing drum	OK / NG	OK / NG
	Inflate bladder for 5 min	No air leakages	OK / NG	OK / NG
	No sharp edges and hangnails	Same as existing drum	OK / NG	OK / NG
	No difference between right and left hardcore segments expansion timing (visually) 	No difference	OK / NG	OK / NG
	Visibility of hardcore segments shape on bladder	Visually visible	OK / NG	OK / NG

Step	Criteria	Plan	Manufacturing *	Acceptance **
On use	Central mark of drum on TireBuilding machine center position	±0.2mm		
	Radial runout of central shaft 	< 0.2 mm		
	Difference of drum height with and without support 	≤4mm		
	Beadlock actual width check: • 200 mm • 300 mm • 500 mm	 200±0,5 mm 300±0,5 mm 500±0,5 mm		
	Beadlock not fall down during beadlock width change and right and left sides move equally 	Beadlock nor fall down Left and right sides move equally	OK / NG OK / NG	OK / NG OK / NG
	Turn-up (at least 10 cycles): • smooth movement of the turn and return • no stops during the turn and return • no displacement of fingers during the maximum speed rotation of the drum • difference of turn-up ply and sidewall length	 Ok Ok Ok ±5 mm	 OK / NG OK / NG OK / NG 	 OK / NG OK / NG OK / NG
After use	All detail's surface after drum disassembling have no wear	No wear and scuffing on details		OK / NG
	Operators trained to perform drum maintenance	Ok		OK / NG

* - filled by Supplier before shipment

** - filled by Customer during equipment acceptance